

A TRANSPORTATION PLAN FOR MARIN



INSTITUTE OF GOVERNMENTAL
STUDIES LIBRARY

FEB 25 1980

UNIVERSITY OF CALIFORNIA

BALANCED TRANSPORTATION PROGRAM

PHASE II

MARIN COUNTY, CALIFORNIA

8/02/239

Marin County
PLANNING
Department

Civic Center San Rafael California 94903 Telephone 479 1100 Werner von Gundell Director

8 June 1972

City-County Planning Council
Marin County Civic Center
San Rafael, California

Board of Supervisors
Marin County Civic Center
San Rafael, California

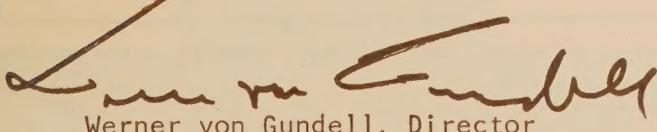
Ladies and Gentlemen:

Transmitted herewith is the Balanced Transportation Program's Phase II Report, A Transportation Plan for Marin. This report summarizes the work of Phase II and the policy recommendations which have been developed based on the technical work.

A technical report for Phase II is also available which documents the details of data analysis and procedures which were used in the technical work program.

Phase III of the Program is scheduled to begin in July and will be aimed at implementing the recommendations made by this report.

Very truly yours,



Werner von Gundell

Werner von Gundell, Director

WvG:h1

This report was prepared by the Marin County Planning Department, Department of Public Works, and Transit District as part of the Balanced Transportation Program. This planning program is a major element of the Marin Countywide Plan being prepared by the City-County Planning Council and the Board of Supervisors. The transportation plan is being done in cooperation with the California Business and Transportation Agency, Department of Public Works, Division of Highways. A technical report on the work of Phase II of the Program is also available in limited quantity.

TECHNICAL STAFF

Marin County Balanced Transportation Program

Robert L. Harrison, Coordinator
John N. Dowden, Senior Planner
Gale R. Bach, Senior Planner
Helen LaHaye, Clerk Typist

Marin County Transit District

James B. Robertson, Acting General Manager
Mary McKenzie, Secretary

Marin County Department of Public Works

Ray W. Foreaker, Jr., Director
Lawrence H. Loder, Assistant Director
James B. Robertson, Traffic Engineer

Marin County Planning Department

Werner von Gundell, Director
Sol Silver, Chief, Advance Planning
Ellis Gans, Principal Planner
Raymond J. Ahearn, Research Planner
Marjorie M. Macris, Senior Planner
George Johnson, Graphics Supervisor
Forest M. Fulton, Graphics Designer
Lawrence Smith, Graphics Designer
Linda Downey, Secretary

CONSULTANT

JHK & Associates, Donald K. Goodrich, Chief Transportation Engineer

Preparation of this report was financed in part from State Highway funds made available by the State of California, Business and Transportation Agency, Department of Public Works, Division of Highways.

The opinions, findings, and conclusions expressed herein are those of the author(s) and not necessarily those of the State of California.

MARIN COUNTY BOARD OF SUPERVISORS

SUPERVISOR

DISTRICT 1

John F. McInnis

DISTRICT 2

Peter R. Arrigoni

DISTRICT 3

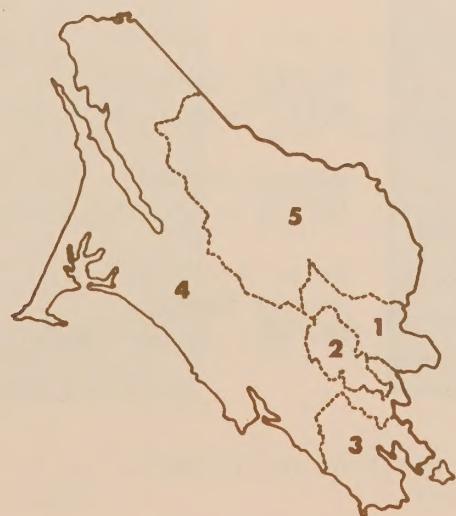
Michael Wornum

DISTRICT 4

L. H. (Bud) Baar

DISTRICT 5

Arnold Baptiste



CITY-COUNTY PLANNING COUNCIL (CCPC)

Jurisdiction	BOARD OF SUPERVISORS and CITY COUNCILMEN	PLANNING COMMISSIONERS
BELVEDERE	Allan Steinau Willard Pittman, Alternate	George Banning
CORTE MADERA	Harold Wagstaff	C. W. Thomas
FAIRFAX	Frank Egger Robert Souza, Alternate	John Hourihan Gloria Duncan, Alternate
LARKSPUR	Robert Lee Joan Sestak, Alternate	Benton Sifford
MILL VALLEY	Edward Boessenecker Robert Burton, Alternate	John deBecker William Lewis, Alternate
NOVATO	George Quesada David Jones, Alternate	John Schoonover Beverly Ehreth, Alternate
ROSS	Frederick Allen R. Farrington Jones, Alternate	Julie Osterloah
SAN ANSELMO	Woodrow Capurro Lewis Stewart, Alternate	Allan Creighton Duan Ragan, Alternate
SAN RAFAEL	Lawrence Mulryan	Joseph Garbarino James Dougan, Alternate
SAUSALITO	Stephen Fraser Robin Sweeny, Alternate	Evert Heynneman
TIBURON	Albert Aramburu Carlisle Becker, Alternate	Victor Banks Allan Thompson, Alternate
MARIN COUNTY	Peter Arrigoni Arnold Baptiste Michael Wornum, Alternate	Margaret Azevedo Bill Lynch John West, Alternate

CALIFORNIA DIVISION OF HIGHWAYS C. F. Greene,
(ex-officio) Deputy District Engineer

CCPC TRANSPORTATION COMMITTEE

JURISDICTION	MEMBER
Mill Valley	John deBecker, Chairman
Mill Valley	Dean Macris
San Rafael	Jeannette Pomeroy
Novato	George Quesada
Inverness	John Rannells
Inverness	Anne West

TECHNICAL ADVISORY COMMITTEE

AGENCY	MEMBER
California Division of Highways, District 4	Frank Tedesco
Association of Bay Area Governments	Julien Baget
Metropolitan Transportation Commission	Wesley Wells
Golden Gate Bridge, Highway & Transportation District	Robert Shields
Marin County Planning Department	Sol Silver
Marin County Department of Public Works	Lawrence Loder
Marin County Transit District	James Robertson
Marin Public Works Association	Norman Wohlischlaeger
City of Sausalito	Robert Leitzell
City of San Anselmo	
Marin Planning Staff's Coordinating Committee	Mark Westfall
City of Novato	John Wolfe
City of San Rafael	

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES.....	vi
SUMMARY.....	vii
Recommendations	vii
Findings	xi
The Conclusion	xii
INTRODUCTION.....	1
Goals of the Countywide Plan	2
BACKGROUND.....	4
Framework for Transportation Planning	4
Organization for Planning	7
Policies and Objectives	9
Assumptions	10
BALANCING LAND-USE, TRANSIT AND HIGHWAYS.....	13
What is Balance?	13
How is Balance Determined?	14
Testing the Options	24
Results of Testing	27
To Balance or Not To Balance - Selecting a Balanced System..	30
The Balanced Transportation Plan	31
IMPLEMENTING BALANCED TRANSPORTATION.....	38
Three Possible Futures for Marin	38
What Do These Three Futures Really Mean?	39
Transportation System Capital Financing	43
Funding the Operation of the Balanced Systems	47
Sources of Public Transit Operating Funds.....	50
Conclusion: Financing Balanced Transportation	53
Techniques of Implementation	54
IMMEDIATE ACTIONS NEEDED FOR IMPLEMENTATION	61
City-County Planning Council	61
Marin County and Transit District	61
Cities of Marin	63
Next Steps - Phase III	63
THE BALANCED TRANSPORTATION PLAN FOR EACH CITY AND LOCAL PLANNING AREA....	65

LIST OF FIGURES

No.	Title	Page
1	1972 Vehicle Traffic Flow	5
2	Balanced Transportation Program Organization Phase II	8
3	Marin County Population	17
4	Marin County Employment	21
5	Land-Use and Travel Patterns - Countywide Plan	33
6	Transit System - Balanced Transportation Plan	34
7	Highway System - Balanced Transportation Plan	37
8	Use of Transit - Balanced Transportation Plan	41
9	Flows of Commuters	57

LIST OF TABLES

1	Marin County Population	16
2	Marin County Employment	20
3	Transportation and Development Alternates	26
4	Transportation Systems Data	28
5	Adopted or Proposed Arterial Highway Expansion NOT included in the Balanced Transportation Plan	36
6	Growth in Total Travel and Population	39
7	Use of Transit	40
8	Capacity of Arterial Highways	42
9	1990 Transportation Systems Capital Costs	44
10	1990 Transportation Systems Capital Resources and Deficits by 1990	45
11	Annual Miles of Bus Operations	48
12	Average Bus Loadings	48
13	Transportation System Operating Costs - Plan Year 1990	49
14	Financing Transit System Operations - Plan Year 1990	51
15	Automobile Fuel Costs and Taxation	52
16	Highway and Transit Lanes Required by 1990	79

SUMMARY

The Balanced Transportation Program is a unified effort by the cities and County of Marin and the California Division of Highways along with regional planning agencies to mesh long-range land-use planning with transportation planning on a systematic countywide basis. Previously, urban development, highways and transit were planned separately without full regard for the impact each decision in one area had on the other two.

The work of Phase II of the Program has led to a recommended combination of land-use, highway and transit systems which are considered to be in balance with one another. The meaning of a balanced transportation system has been found to be the combination of transit and highways which serves the social, economic and political goals as well as the land-use planning policies of a community. It does this by providing a reasonable level of mobility for the population through coordinated use of all transportation modes and without major environmental impact.

RECOMMENDATIONS

This report recommends transit, highway, and ferry system improvements that will support the physical, social, and economic policies of the Marin Countywide Plan. In turn, successful accomplishment of the transportation proposals will depend upon achieving the plan's policies for land-use and community development.

Specific proposals of the Balanced Transportation Program are designed to achieve these policy objectives:

1. Land-use - A policy of controlled growth should be adopted and implemented by all the cities and County of Marin. The costs of not controlling growth, both in environment and economic terms, have been found so high that providing a balanced trans-

portation system will be almost impossible unless the rate of growth is brought under public regulation.

2. Level of Mobility - A high level of mobility is important to the quality of life in Marin and should be maintained at or near the level found in 1972. This means that where congestion exists today it would continue to exist in the future but should not grow sharply worse. A congestion-free or "good" level of service has been found impossible to achieve at certain points on the highway system without major environmental disruption.
3. Providing Mobility - Needed urban mobility should be provided by greatly expanding the transit system in Marin along with some expansion of the highway system. All new transportation facilities should be restricted to areas deemed desirable for urban development. An exception may be new facilities to provide access to specific rural recreational sites. This need will be studied in detail in Phase III.
4. Scale of Transportation Facilities - The capacity of both transit and highway systems should be scaled to the travel needs of the adopted Countywide Plan. The 1990 population allowed under the Preliminary Countywide Plan would produce travel volumes in the Eastern Urban Corridor that would require no more than an exclusive right-of-way bus transit route and an eight-lane freeway.
5. Keeping the Options Open - The county should remain sufficiently flexible in its transportation planning that adoption of new ideas can be made with minimal disruption in the planning process. Innovative transit systems, not studied in Phase II, appear to be a possibility by 1990. These systems will require funding which might not be available should the county commit

itself to huge, one-time, capital investments such as other Bay Area Counties have done in the Bay Area Rapid Transit District.

6. Implementing Balanced Transportation - The county should aggressively pursue the implementation of both the recommended transit and highway systems in a series of manageable, fundable and logical programmed steps. Active pursuit of federal grants and vigorous legislative programs will be needed to provide the funding for large-scale intra-county transit and highway systems.

Following is a summary of specific program recommendations for transportation systems to be provided by 1990:

Transit - Trans-bay service should be provided by a bus system operating on its own separately constructed right-of-way in the Route 101 corridor, supplemented by ferry service from Sausalito, Tiburon, Larkspur and Las Gallinas Creek. This system would use about 300 buses and be similar to Alternate 3-A developed by Kaiser Engineers for the Golden Gate Corridor Study in 1971.

However, in contrast to the Corridor Study, it is recommended that a second deck on the Golden Gate Bridge should not be built, for either transit or automobiles.

Intra-county service would be provided by a fleet of buses which should grow to 350 coaches and operate on 23 miles of east-west busways by 1990. Over half the fleet would be "mini-buses" which could penetrate deeply into Marin's hilly neighborhoods. The average resident of east Marin would have a bus passing within walking distance of his home every five to ten minutes at the peak hour.

In order to make the transit system as effective as possible, it is recommended that a report be filed with all new development proposals on the availability of transit service and that the developer be responsible to coordinate with public transit agencies for service before the development approval is granted.

Freeways - No new freeways should be built. The Route 101 freeway should expand to a full eight-lanes from the Golden Gate Bridge to Route 37 with the new lanes reserved for exclusive bus use. Initially, bus lanes might be used for both buses and car pools with cars eventually excluded when the number of transit vehicles grew to fill the lanes to capacity. In the future, as the separate bus right-of-way is constructed parallel to 101, the bus lanes in the roadway could either continue in transit service or be used by both autos and transit. From Route 37 to Gross Field, six lanes of freeway are recommended, with a four lane freeway from there to the Sonoma County line. All sections of Marin freeways would be controlled by ramp metering and further automated as the techniques of automatic freeways become reality.

It is recommended that the cities and County of Marin start to work now with the State Division of Highways in order to provide both bus and car-pool lanes and ramp metering as quickly as possible. It will be easier to use new freeway lanes exclusively for buses or buses and car-pools if the lanes are never opened to general traffic. Five miles of new lanes between Sausalito and Greenbrae are scheduled to open by 1974.

Arterial Highways - Major arterials of east Marin should be four lanes, except for a six-lane route from San Rafael, through the Hub to Fairfax and three short sections of six-lane arterial approaching the Route 101 freeway. Expansion of arterials will not only provide added auto capacity, but will allow exclusive transit lane operation as well. Special bus lanes are impractical on two-lane roads except

for "bus-only" operation on selected routes.

Three new routes are proposed:

- A two-lane arterial from Lucas Valley Road to Sir Francis Drake Boulevard at White Hill Pass.
- A two-lane arterial to serve the Ferry Terminal at Las Gallinas Creek.
- A four-lane arterial from South San Pedro Road to Route 17/101 at Bellam Boulevard.

As each of these routes passes through areas proposed for open space in the Countywide Plan it is strongly recommended that no roadway be built until the open space has been permanently secured.

Cost of this balanced transportation plan is estimated at over \$500 million by 1990 -- considerably lower than the costs of other systems studied. Known sources of capital funding may provide a little over \$400 million. Additional sources for the \$100 million difference will have to be found if the system is to be built. The cost of operating the transit portion of the balanced system, not covered by presently available revenues, were estimated to be almost \$40 million annually by 1990. These operating costs would also have to be provided by new public expenditures.

The cost to Marin residents in 1972 to operate their private vehicles on the present highway system is approximately \$150 million a year.

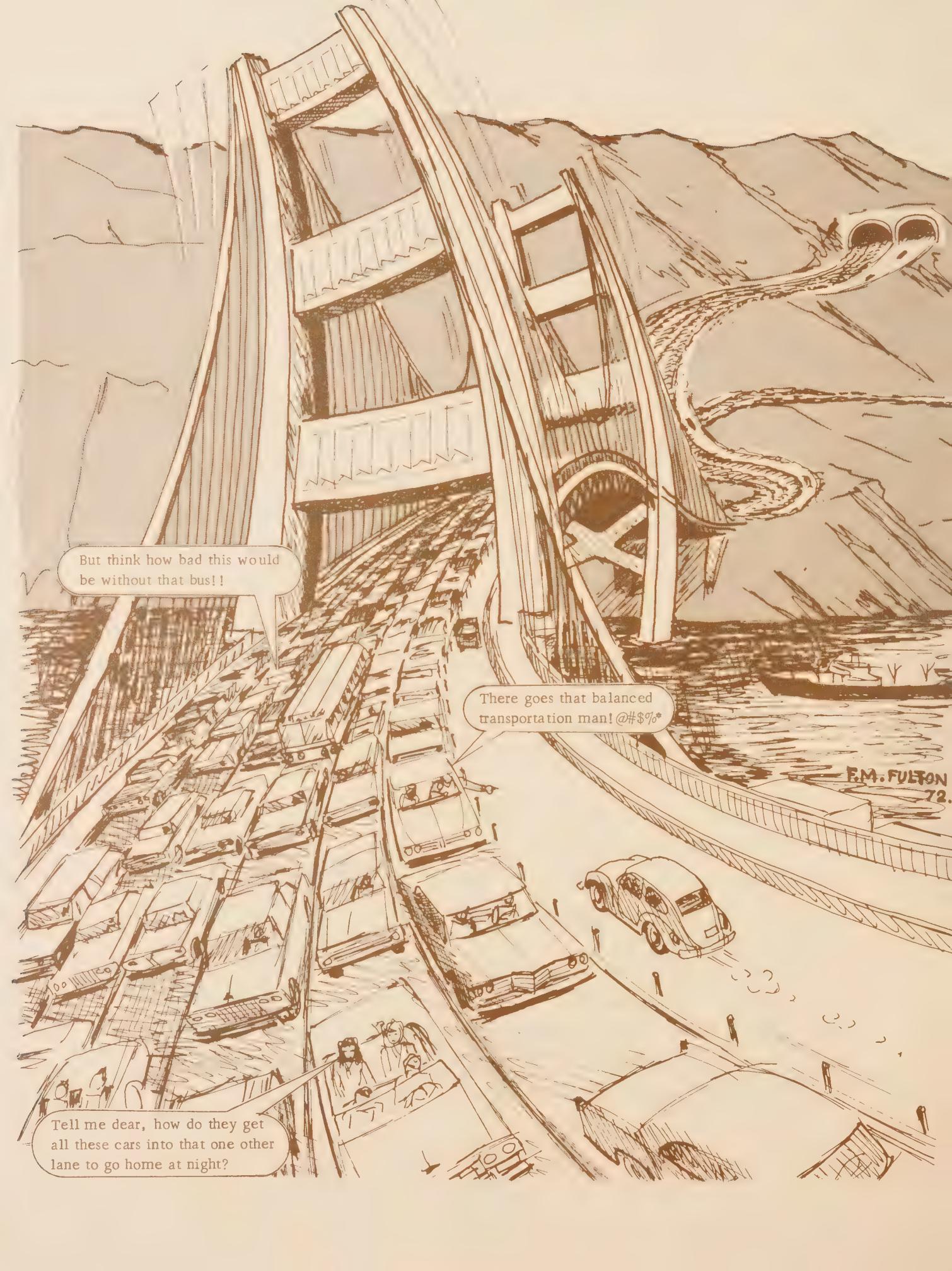
FINDINGS

These recommendations are based on thorough analysis of transportation and land-use alternatives using the Balanced Transportation Program's modeling techniques. Among the studies major findings were:

- Controlling the pace and location of development is a critical first step in implementing a balanced transportation plan. Providing a balanced system without strong land-use controls is virtually impossible from both environmental and economic feasibility viewpoints.
- Providing good access to rural undeveloped areas such as Bolinas, Nicasio and other remote sections of West Marin would stimulate the pace of development in these areas by a significant amount. No such improved access has been recommended.
- The amount of travel in Marin will grow even faster than population, making it exceedingly difficult to provide transportation facilities that are compatible with the County's fragile environment.
- Commute travel to San Francisco is now only about one-seventh of total travel in the rush hour, and is projected to decline slightly as a proportion of total travel. Providing a transit service oriented at only the commuter will offer very little opportunity for transit use by the remaining six-sevenths of Marin travelers.

THE CONCLUSION

Marin can reap the benefits of a balanced transportation and community development plan, but only if the people of Marin are ready and willing to make a strong commitment to it. The advantages of reduced environmental impact along with a high level of urban mobility can be had, but the price is not cheap. The consequences of not providing a balanced land-use and transportation system, as revealed by the technical work of Phase II, make the costs appear much more reasonable and the need emphatic.



But think how bad this would
be without that bus!!

There goes that balanced
transportation man! @#\$%*

Tell me dear, how do they get
all these cars into that one other
lane to go home at night?

E.M. FULTON
72.

INTRODUCTION

The Balanced Transportation Program was established by the Marin County Board of Supervisors in 1968 to coordinate comprehensive transportation and land-use planning in Marin.

Previously, transportation planning had been undertaken by individual local, regional and state agencies, each concerned with its own special interest, and with minimum coordination with planning by other agencies. A strong negative public reaction to proposed transportation facilities serving Marin County in 1967 initiated a thorough re-evaluation of transportation planning methods. The Route 17 freeway in the Ross Valley, a second Golden Gate Bridge, and a second deck on the existing span, had been recommended to meet the demand that would have been created by development under locally adopted land-use plans.

Phase I of the Balanced Transportation Program, completed in 1970, quantified what these local plans would mean in travel demand. The results: The ultimate planned population of 768,000 would require massive road building -- for example, expansion of Route 101 to three times its width by the year 2020. When Phase I brought the weaknesses of uncoordinated planning to light, work began on a Countywide Plan that would change the way planning was done in Marin.

An important accomplishment of Phase I was the creation of close technical coordination among local, county, regional and state agencies responsible for transportation planning. This close inter-jurisdictional cooperation helps to assure that the local communities of Marin will not again be forced to react to massive transportation proposals prepared by outside agencies.

Phase II has built upon both the coordinating and technical foundation of Phase I. Seven alternative transportation systems and three patterns of land development for Marin in 1990 have been tested using the technical procedures developed in Phase II. The systems recommended in this report represent a balance of highways, transit and development which best meet the goals expressed in the Countywide Plan.

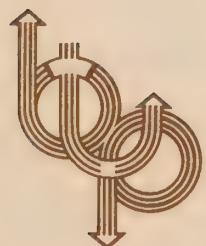
GOALS OF THE COUNTYWIDE PLAN

The Preliminary Countywide Plan was presented for widespread public discussion in 1971. Its three main goals achieved general support during the review process:

1. Discourage rapid or disruptive population growth, but encourage social and economic diversity within neighborhoods and in the County as a whole. Under the controls recommended by the Plan, Marin's population would not exceed 285,000 by 1990, compared with 389,000 in an uncontrolled market. The County's 1970 population was 209,574.
2. Achieve greater economic balance for Marin, by increasing the number of jobs and the supply of housing for people who will hold them. Marin should strive to become less a bedroom community and a more self-sufficient economic unit. Plan projections indicate that Marin should employ 94,400 in 1990, compared with 57,700 in 1970.
3. Achieve high quality in the natural and built environments, through a balanced system of transportation, land-use, and open space. Under the Plan, 37% of the land in the Eastern Urban Corridor would be developed by 1990, compared with 45% under the unconstrained market. In 1970, 30% of this corridor was developed.

This report describes the organization of the Balanced Transportation Program, its policy guidelines and basic assumptions, and its major technical work. To gain a full understanding of the Balanced Transportation Program it is recommended that the Phase I Report, An Evaluation of Local Plans, be reviewed concurrently with this report on the work of Phase II.

Phase III of the Program, now underway, will design an intra-county transit system, recommend a capital improvement program and propose policies for recreational transportation.



BACKGROUND

FRAMEWORK FOR TRANSPORTATION PLANNING

The transportation problems found in 1972 in Marin are typical of rapidly growing suburban communities. Transportation facilities, along with many other important public services, have simply not been able to keep pace with burgeoning development.

A review of a few important statistics can put the problem in perspective. Population has increased from 85,600 in 1950 to almost 210,000 in 1972, or nearly $2\frac{1}{2}$ times. Automobile ownership has risen even more rapidly over this period; in 1972 Marin averages almost two private vehicles for every household, a growth of over $3\frac{1}{2}$ times the 1950 auto registration.

During this time, arterial highway capacity increased by only one-fourth, from 508 lane miles in 1950 to 645 in 1972. The comparison of auto ownership and highway capacity expansions is a good indication of the shape of Marin's transportation problem: Ever increasing use of autos, modest highway expansion, and a dying transit service. The resulting flow of vehicles on Marin's highways in 1972 is shown in Figure 1.

With the initiation of new bus service by the Golden Gate Bridge, Highway and Transportation District in January 1972, Marin had its first tentative reversal of a continuing downward spiral of transit usage. The Greyhound Bus System of the early 1950's carried almost half of the Marin commuters to San Francisco. This figure had dropped to less than 15% by 1971. The Bridge District has set a goal of returning to the 50% rate of transit use by no later than the year 1980.

With the scale of the transportation problem approaching crisis proportions in the 1960's a series of transportation system propos-

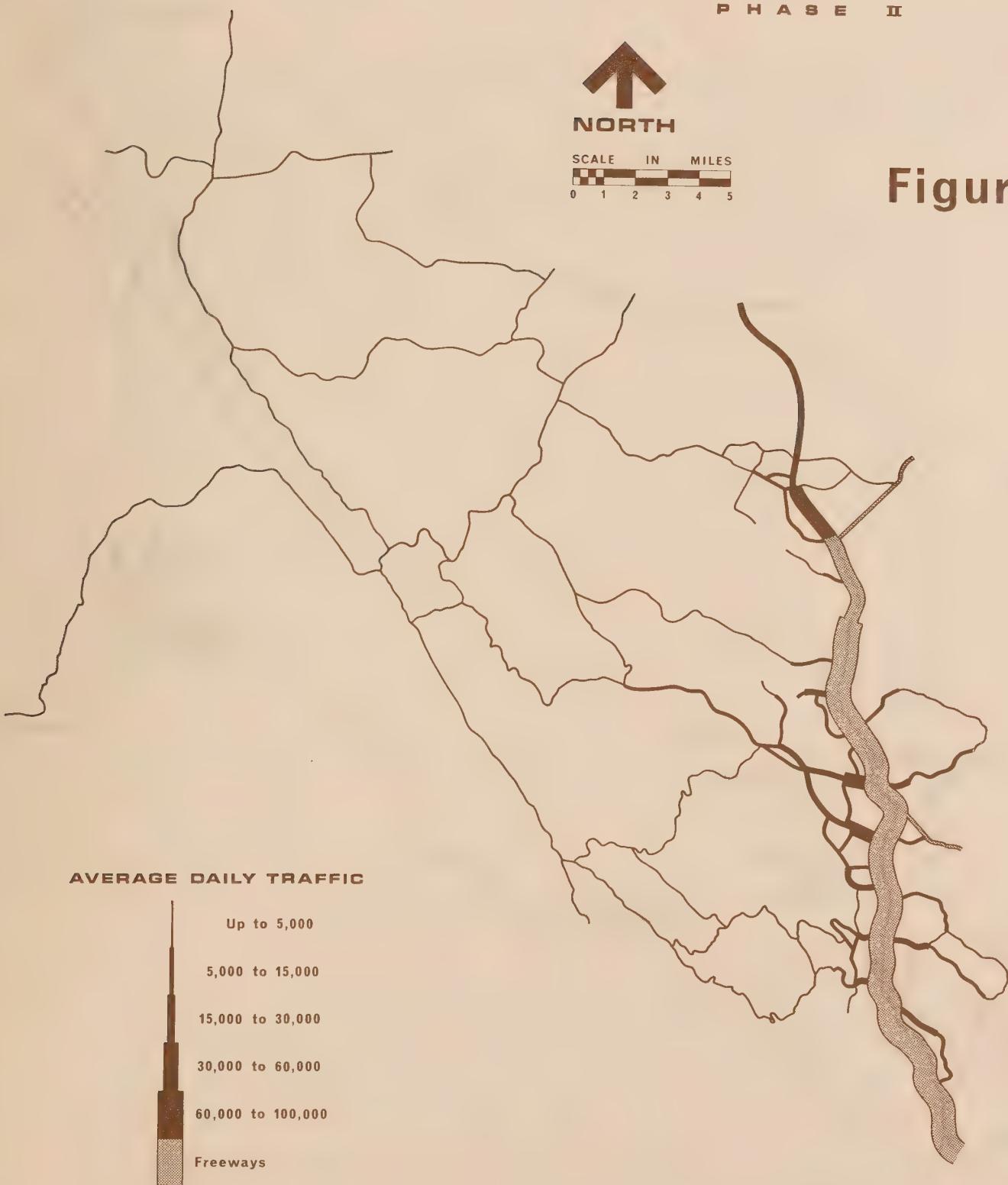
MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II



NORTH

SCALE IN MILES

Figure 1



1972 VEHICLE TRAFFIC FLOW

als were thrust upon Marin by various state and regional agencies. Most of these proposals were for a specific facility, a single mode, or for a limited geographic area. Important among these were: The Division of Highways Route 17 freeway proposals in the Ross Valley; the Golden Gate Bridge District's study of a second deck on the bridge for vehicles; and the Division of Bay Toll Crossing's proposals for new crossing facilities between Marin and San Francisco. The local jurisdictions of Marin, each with its own inwardly focusing local planning effort, simply did not have the technical ability to respond rationally to these outside proposals. Aroused public opinion resulted in a paralysis of efforts to implement transportation plans.

In an effort to break the log-jam of decision making on transportation planning for Marin, the Board of Supervisors in 1968 authorized a consultant to assist the Department of Public Works and the Planning Department in developing a prospectus for a Balanced Transportation Program.

The first phase of work was completed in March of 1970. The major accomplishments of Phase I were:

1. Creation of a strong working cooperative arrangement among agencies responsible for transportation planning at state, regional, county and local level.
2. Establishment of the technical process by which alternate transportation and land-use systems can be tested.
3. Technical evaluation of the locally adopted general plans from a transportation system viewpoint. The conclusion of the evaluation was that local plans generally allowed far too much development to be properly serviced by the transportation system proposals of these same plans.

The work of Phase I is documented in a report entitled An Evaluation of Local Plans.

ORGANIZATION FOR PLANNING

One of the important accomplishments of the first phase of the Balanced Transportation Program was the establishment of a strong working cooperation among planning agencies at local, county, regional, and state levels.

A cooperative agreement covering Phase II was negotiated with the California Division of Highways to provide for continuing technical and financial assistance. At the regional level agreements for technical review and cooperation were signed with the Association of Bay Area Governments and the Metropolitan Transportation Commission.

The local governments of Marin are included in both the technical and policy direction areas of the Phase II organization. As shown in Figure 2, the organization of Phase II is centered on the City-County Planning Council of Marin (CCPC). This council, composed of councilmen and planning commissioners from the cities and the county has been directed by the Board of Supervisors to provide policy direction for the Balanced Transportation Program. CCPC also directs other countywide planning programs. A committee of interested citizens advises the CCPC on transportation policy.

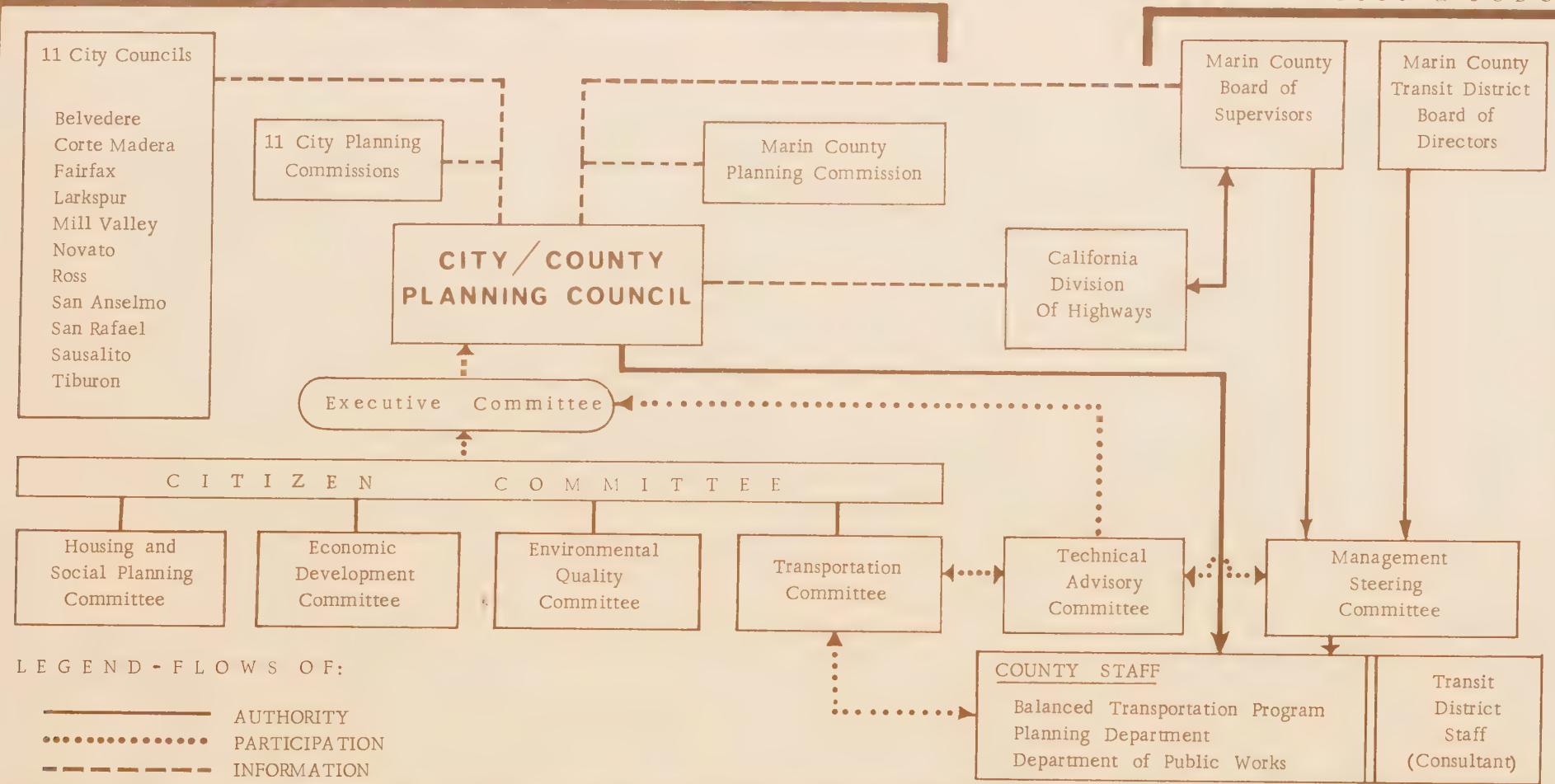
Technical matters are reported to the CCPC from the Technical Advisory Committee (TAC). It is through the TAC that local jurisdictions, as well as regional agencies and the Division of Highways, directly affected the technical work of Phase II.

Complementing the policy direction of the CCPC is the administration and financing of the program provided by the Marin County

BALANCED TRANSPORTATION PROGRAM ORGANIZATION - PHASE II

POLICY DIRECTION

ADMINISTRATION & BUDGET



TECHNICAL ADVISORY COMMITTEE

California Division of Highways
 Association of Bay Area Governments
 Metropolitan Transportation Commission
 Marin County Planning Department
 Marin County Department of Public Works
 Marin County Transit District

Marin Planning Staff's Coordinating Committee
 City of Novato
 City of San Rafael
 Marin Public Works Association
 City of Sausalito
 City of San Anselmo
 Golden Gate Bridge, Highway, and Transportation District

OBSERVERS

City of San Francisco Planning Department
 County of Sonoma Planning Department

Figure 2

Board of Supervisors and the Marin County Transit District. Work schedules and budgets are regulated by a committee composed of county and Transit District management.

Technical work is done by Balanced Transportation Program staff assisted by a technical consultant. Transit District staff, originally scheduled to participate in Phase II, was replaced by an outside consultant when that staff was shifted to the Golden Gate Bridge, Highway and Transportation District.

This continuing cooperative planning organization is the core of the Balanced Transportation Program. It is intended to promote technical and policy coordination among all levels of government that have an interest in Marin County's transportation future, and to assure that transportation planning functions within strong policy guidelines at the local level.

POLICIES AND OBJECTIVES

A series of general policy directions have been issued by the Board of Supervisors and the City-County Planning Council since the inception of the Balanced Transportation Program in 1968. The program has been designed to meet these policy guidelines, and the main objective of Phase II has been to recommend the transportation plan which can most nearly fulfill these policies.

The Board of Supervisors directed in 1968 that:

1. Established communities must be protected from the invasion of freeways as we now know them.
2. The environment, including both the physical landscape and the air we breathe, must be protected.
3. Public Transit shall be given positive weighting over the private auto wherever possible. This policy directive is made in recognition not only of the smog problem caused by excessive

automobile use, but also because we shall obtain better use of our transportation tax dollar through a balanced use of all modes of transportation.

4. All Marin taxpayers will pay for this program. Therefore, all city governments, as well as the county, must be able to use it. The information developed will be public in any case, but the city governments as well as the county, must be able to phrase and ask questions which will be fed into the computers.

During the course of Phase II these general directives have been re-iterated and made more specific by the City-County Planning Council. The Council has expressed the following policies:

1. In order to protect established communities from the invasions of freeways, future transportation systems in Marin must achieve a balance between transit and highways.
2. Transportation systems must also be kept in balance with land-use planning. Recognizing the results of Phase I, when land-use development was found far too extensive to be served by planned transportation facilities, the Council has directed that future land-use patterns should be city centered and oriented toward transit facilities as much as possible.
3. Transit must lessen the dependence on the auto by offering good intra-county service as well as service oriented to the San Francisco commuter. The Council directed that a system specifically designed to attract intra-county travelers should be tested as part of Phase II. In addition, the CCPC directed that all transit systems tested should be assumed to be subsidized by public funds.

The technical work of Phase II has been designed to respond to the policy guidelines listed above. As described in detail in later sections of this report, the results of the technical work have been used to recommend transportation and land-use systems which will fulfill the policy directives as completely as current technology will allow.

ASSUMPTIONS

10 ● These recommendations are based on assumptions about the role of transportation, or mobility, in the amenities of a suburban life

style. The high level of mobility in our current society provides citizens with a wide range of activity opportunities.

Most Marinites are now able to change their jobs or their homes without totally disrupting their lives because they had to change both. A variety of shopping, cultural, and recreational attractions are now convenient to the majority of Marin residents. Although the San Francisco bound commuter experiences some delay in his trips to work, the majority of Marin trips are made with a minimum of inconvenience.

Mobility will be a necessity if the Countywide Plan goal of increased economic self-sufficiency is to be met. It will be difficult to attract new job opportunities to Marin if the movements of goods and people are restricted by an inefficient transportation system.

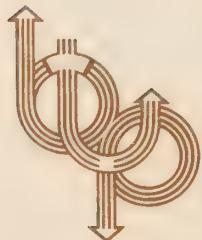
It is for these reasons that the recommended transportation system assumes mobility should not be sharply reduced in the future. This does not mean that the transportation system must be totally dependent on the automobile. For some trip purposes public transit is the most appropriate method of providing needed mobility. The recommended transportation system has been designed to assure that mobility by whatever mode, will be the most efficient, and wherever possible at least as good as 1972 conditions.

- The greatest travel demands on most routes of urbanized Marin are projected to continue to occur during the morning and evening rush hours. Based on the evidence, it is assumed that most of the labor force and school population will continue to leave their homes for work or school in the morning and return home in the afternoon of each working day. By planning facilities to "fit" these rush hour travel conditions, it is projected that travel demands at other periods can be accommodated. Phase II has, therefore, studied only the workday travel at peak hour in detail.

A limitation of the procedure to study rush hour traffic only occurs on those routes where the heaviest travel is not primarily home-to-work nor home-to-school trips. These facilities are most heavily used for recreation travel purposes and experience peak travel conditions on Summer week-ends rather than weekdays. A detailed study of recreational flows will be part of Phase III of the Balanced Transportation Program. This limitation does not affect the vast majority of routes in east Marin, where the week-day peak hour is expected to continue to be the period of greatest travel in the future.

- It has been further assumed that the amount of trip making and its general distribution in terms of both destination and time of occurrence will not vary greatly from the current situation. This means that basic travel habits have been assumed to remain about the same as in 1972. The conditions which entice a driver to switch from his auto to a transit vehicle in 1972 were projected to be equally effective in causing use of transit in the planned future year transportation system.
- No major technological breakthroughs have been assumed. It is expected that the transportation system of 1990 will be built around a combination of private individual and public transit vehicles using rubber tires on paved surfaces. The design of future systems has been limited to known technology, based on this assumption.

Should our day-by-day life style dramatically change from the above assumptions, conclusions of Phase II will have to be modified to fit the new circumstances. It is in the light of the above listed assumptions that alternate transportation systems have been evaluated and the recommended system selected.



BALANCING LAND-USE, TRANSIT AND HIGHWAYS

WHAT IS BALANCE?

A major goal of Phase II is to develop a balanced transportation system. This idea of balance has been applied to at least two separate concepts: first, transportation and land-use systems must be kept in balance; and second, a balance must be achieved between the major modes of transportation, -- transit, and private automobile.

But, what is balance?

Phase I found that planned land-use was out of balance with planned transportation facilities. This meant that local adopted plans had not proposed facilities which could provide Marin residents with a reasonable level of mobility and at the same time keep from severely damaging Marin's environment. The need for a 12 to 18-lane Route 101, as found in Phase I, is an unacceptable alternative from an environmental viewpoint.

Using the development proposals of the local plans, and a Route 101 with a more reasonable number of lanes, would result in a severe restriction on the mobility of the plan's projected population. Neither an 18-lane freeway nor a major restriction of mobility are compatible with the concept of balance.

Too much mobility, however, can also have important environmental impacts. Phase II has found that providing improved access to West Marin will stimulate development rates much above those felt to be compatible with countywide policy. Transportation community development should be used as a part of the mechanism needed to implement planning goals. Access should not be provided to areas prematurely and it should not be expanded at all to areas designated as open space.

Balanced transportation should provide a reasonable level of mobility, without major environmental impacts, to serve the development patterns proposed by the Countywide Plan. A reasonable level of mobility is defined as equal or nearly equal to the conditions of 1972 in Marin.

The balance between the major modes of transportation implies a compromise, recognizing that the capabilities of each mode vary widely and that each is suitable for application at a specific point or for a specific purpose. For example, trips into dense areas such as downtown San Francisco at rush hour are more easily accomplished by transit, due to congestion and lack of parking. Trips to low-density residential or rural areas, particularly in off peak hours, are more easily accomplished by automobile.

A transportation system balance between major modes will use each mode so that the overall system is most responsive to public needs. Each mode is designed to complement and supplement the other, rather than compete for potential public support. The overall transportation policy should be proposed in terms of all possible modes, rather than by any single mode as has been done in the past by special purpose agencies.

In conclusion, the balanced transportation system should serve the social, economic and political goals as well as the land-use planning policies of a community. It does this by providing a reasonable level of mobility for the population through coordinated use of all transportation modes and without major environmental impact.

HOW IS BALANCE DETERMINED?

This brief discussion on defining balanced transportation reveals the many factors that must be considered by transportation planning.

The Phase II Program sought to avoid the narrowness of traditional transportation study reports, such as the Bay Area Transportation Study Commission Report of 1969 which usually consider only one future land-use pattern and relatively limited transportation system alternatives. By contrast, Phase II has studied a wide range of land-use and transportation system possibilities. Somewhere in this range the actual future of Marin is likely to be found.

Land-Use Options

Phase II has considered alternative futures for Marin by using three possible 1990 population totals: 285,000, 389,000 and 417,000. The methods used to develop the three projections were based on three quite different basic assumptions.

The 417,000 figure, the greatest growth from Marin's 1972 population of 210,000, was based on the assumption that the regional real estate market operated without planning constraint and that improved access was provided to West Marin via the Route 1, 17, and 37 freeways. This development alternative is called Market Forecast Bass V-B.

The second highest growth projection, 389,000 people by 1990, was also based on an unconstrained real estate market, but no new access to West Marin was assumed to be provided by 1990. This development alternative was labeled Market Forecast BASS V-A

The lowest level of growth, 285,000 people by 1990, is based on implementation of the Countywide Plan. This assumes that no new access to West Marin is provided and that a major open space area significantly affects growth in East Marin. See Table 1 and Figure 3.

TABLE 1
MARIN COUNTY POPULATION

Corridors/Planning Areas	1970 Base Year	1990 Projections		
		Countywide Plan ¹	Market Forecasts	
			BASS V-A ²	BASS V-B ³
EASTERN URBAN CORRIDOR				
Novato Area	39,212	65,600	75,600	76,400
Las Gallinas Valley	25,798	37,100	57,400	54,100
San Rafael Basin	31,600	39,400	44,100	44,900
Upper Ross Valley	26,947	31,800	34,300	39,000
Lower Ross Valley	31,949	38,600	40,600	40,300
Richardson Bay Communities	45,063	56,400	69,000	69,300
Subtotal	200,569	268,900	321,000	324,000
INLAND-RURAL CORRIDOR				
North Marin	583	1,700	24,000	24,700
Nicasio Valley	246	1,000	6,400	11,000
San Geronimo-Lagunitas Basin	3,123	4,100	7,400	11,300
Subtotal	3,952	6,800	37,800	47,000
COASTAL-RECREATION CORRIDOR				
West Marin	2,857	6,500	12,000	18,500
Bolinas-Stinson Beach	1,389	1,900	2,900	11,300
Southwest Coast	808	900	15,300	16,200
Subtotal	5,054	9,300	30,200	46,000
COUNTY TOTALS	209,574	285,000	389,000	417,000

1 Projections based on quantifying the policies of the Preliminary Countywide Plan.

2 BASS V-A are the projections made by the Bay Area Simulation Study (BASS) computer model assuming no planning restrictions on development and a transportation system which provides accessibility equal to 1972 conditions.

3 BASS V-B are projections based on the BASS model as described for BASS V-A above but also includes greatly improved access to West Marin via Route 1, 17, and 37 freeways.

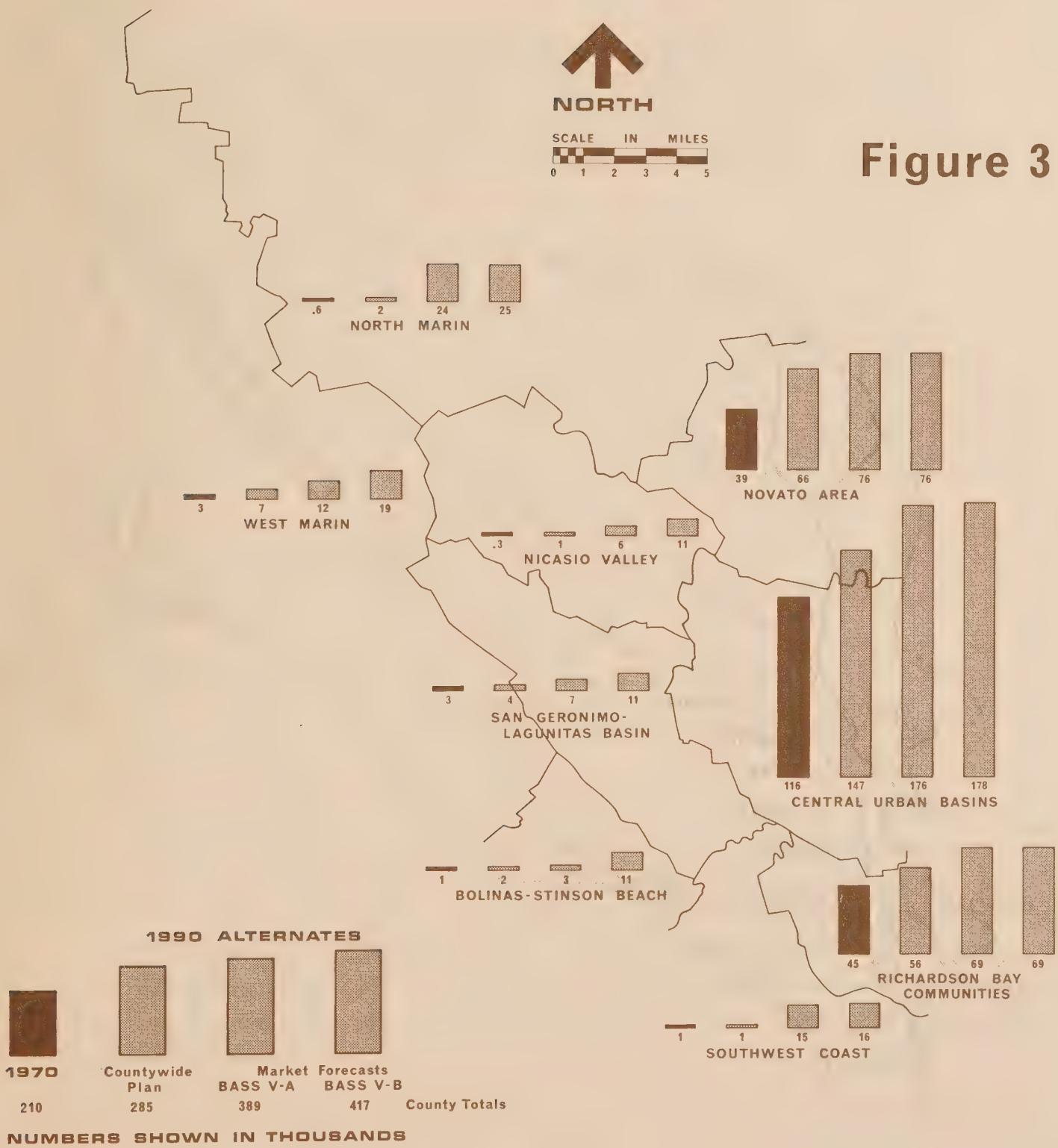
NOTE: For graphical clarity four of the planning areas listed above have been combined in Figure 3 into a single geographical area. The Central Urban Basins of Figure 3 include the Las Gallinas Valley, the San Rafael Basin and the Upper and Lower Ross Valleys.

MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II



SCALE IN MILES
0 1 2 3 4 5

Figure 3



MARIN COUNTY POPULATION

Both of the unconstrained real estate market projections were developed using the Bay Area Simulation Study (BASS). The BASS model is a computerized version of the regional real estate market, taking into account many of the forces found in an unconstrained market.

The BASS model simulates the housing market by locating new dwelling units with reference to the available supply of existing housing, land available for new development, and the accessibility of each area to employment opportunities. The model allows Marin to compete with other similar areas throughout the Bay Area for new residents who may work in a commute area such as San Francisco. It does not recognize zoning or planning as constraints to placing new homes or apartments throughout the area.

The impact of varying access to an area is readily apparent (as shown in Table 1 and Figure 3) by comparing development projections for the western portion of Marin when freeways were provided (Market Forecast B) to those when no new access was assumed (Market Forecast A). Areas now considered remote such as Bolinas and Stinson Beach would become part of the commuter world with the full freeway system. Other areas such as West Marin and Nicasio would become urban sprawl or overspill areas if their accessibility were increased by freeways, while the areas around existing cities would grow less than if freeways to the west were not provided. The BASS model confirms the expected results that freeways to West Marin would encourage dispersed development over much of the county, development described as undesirable by the Countywide Plan. If full freeway access were provided, by 1990 about one quarter of the county's new population would live in western Marin.

The Countywide Plan alternative is based on policy adopted by the City-County Planning Council that a "city-centered" development

pattern should be implemented in Marin. The Countywide Plan, therefore, allocates 92% of new development to east Marin. This policy would not only leave West Marin areas generally rural, but also would provide for a development pattern in east Marin more susceptible to transit service.

Jobs and shopping facilities would develop about the same under the three alternatives. Local shopping such as grocery stores and dry cleaners were assumed to vary in proportion to population, while more basic services such as finance and real estate would remain fairly constant. Total employment for each development alternative is shown in Table 2 and Figure 4. For the Countywide Plan Alternative this would mean more jobs per capita would be available in Marin and thus cause a reduction in the relative amount of commuting to San Francisco. This would not mean commuting would actually decrease, but implementation of the plan would mean less total commuting in 1990 than the unconstrained market forces would dictate.

This has been a quick summary of the alternatives considered in Phase II. What of the transportation systems to serve the development patterns?

Transit Options

As Phase II considered a broad spectrum of possible development options, it also looked at a wide range of transit systems.

The least advanced system considered, Transit Number 1 (TQ-1), was the Optimum Bus System as designed by the Marin County Transit District, and as operated by the Golden Gate Bridge District in 1972. This is primarily a commuter bus system sharing highway lanes with automobile traffic.

TABLE 2
MARIN COUNTY EMPLOYMENT

Corridors/Planning Areas	1970 Base Year	1990 Projections		
		Countywide Plan	Market Forecasts	
			BASS V-A	BASS V-B
EASTERN URBAN CORRIDOR				
Novato Area	9,900	21,800	22,100	22,500
Las Gallinas Valley	8,000	14,700	15,100	14,900
San Rafael Basin	14,800	19,000	17,700	18,400
Upper Ross Valley	4,300	4,700	4,200	4,500
Lower Ross Valley	10,400	17,100	15,700	16,300
Richardson Bay Communities	9,100	14,100	13,800	14,000
Subtotal	56,500	91,400	88,600	90,600
INLAND-RURAL CORRIDOR				
North Marin	30	300	1,300	1,500
Nicasio Valley	20	200	600	900
San Geronimo-Lagunitas Basin	150	700	600	700
Subtotal	200	1,200	2,500	3,100
COASTAL-RECREATION CORRIDOR				
West Marin	600	1,300	2,600	3,900
Bolinas-Stinson Beach	100	400	400	1,500
Southwest Coast	300	100	2,500	2,700
Subtotal	1,000	1,800	5,500	8,100
COUNTY TOTALS	57,700	94,400	96,600	101,800

NOTE: See the Notes on Table 1 for a description of the three 1990 projections.

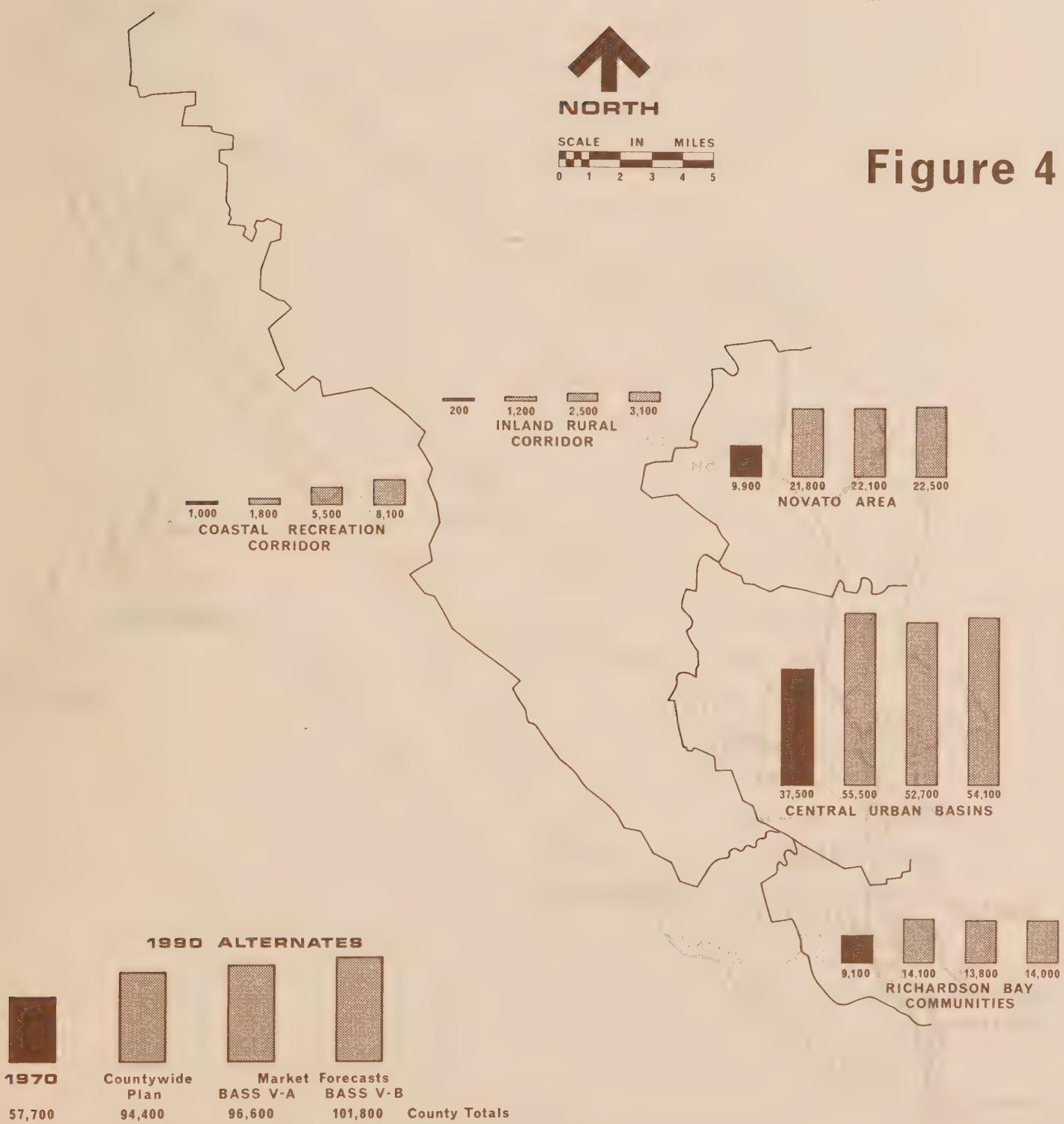
For graphical clarity Figure 4 shows data for three geographical areas in the Eastern Urban Corridor and total data for the Inland Rural and Coastal Recreation Corridors. The Central Urban Basin of Figure 4 combines the Las Gallinas Valley, San Rafael Basin, and Upper and Lower Ross Valleys.

MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II



SCALE IN MILES
0 1 2 3 4 5

Figure 4



MARIN COUNTY EMPLOYMENT

The bus system was assumed to be supplemented by ferries from Sausalito, Tiburon, Larkspur, and Las Gallinas Creek to San Francisco by the 1990 test year.

The second transit option tested, Transit System 2 (TQ-2), was the Exclusive Right-of-way Bus System as designed by Kaiser Engineers for the Golden Gate Corridor Study. The system was designed with a separate right-of-way for buses from Novato to downtown San Francisco, involving about 300 buses, and projected to cost about one half of a billion dollars*. At that price, it was expected the system should offer a fairly high level of service to Marin. The technical work of Phase II found this was not the case for intra-county travel. The Exclusive Right-of-way Bus System would be able to attract almost one half of the commuters to San Francisco from their cars but under the most favorable option tested could attract only 1.4% of Marinites making local intra-county trips.

The CCPC directed a transit system be tested which would serve intra-county travel needs. The system would be conceptually laid out but not detailed to the level of specific route structure.

The new service was labeled the Idealized Transit System, Transit Number 3 (TQ-3). It approaches the maximum service that can be attained for local travel needs within existing transit technology. In the peak hour, the typical resident of east Marin would have a bus pass within walking distance of his home every five to ten minutes. The buses would travel on their own right-of-way or on special highway lanes bypassing those areas where automobiles are bogged down in congestion. This system would place 350 buses into intra-Marin service along with the 300 buses serving commute needs to San Francisco. Both the Exclusive Right-of-way Bus System and the Idealized Transit System would be supplemented by ferry service between San Francisco and Sausalito, Tiburon, Larkspur, and Las Gallinas Creek.

Highway Options

As with transit and land-use systems, highway options tested in Phase II covered a wide range of alternatives, from major highway system expansions to an option where not a single new foot of concrete was assumed to be poured.

The greatest expansion of the highway system tested was the routes as proposed in the California Freeway and Expressway Plan, adopted by the State Legislature in 1959. The system was also endorsed by the regional planning agencies and has been called the Regional Freeway and Expressway Plan, Highway Number 2 (H-2). It includes the Route 1, 17, and 37 freeway/expressway to West Marin as well as county arterial expansion in east Marin. This system was assumed to operate at a level of service as good as or slightly better than the 1972 Marin highway network.

A second level of highway expansion was tested in the system called the Marin Composite Highway Plan, Highway Number 1 (H-1). No new freeways were assumed in this test. A parkway along Route 1 from the Golden Gate Bridge to Muir Beach was included along with new inter-valley connections in east Marin. The level of service provided by this system was assumed to be equal to or slightly lower than available from Marin's 1972 highway system.

A third highway system was tested based on not expanding the 1970 Marin road network. This meant no new roads were added nor were any existing roads allowed to be widened in response to increasing traffic congestion. This network was called the Constrained Highway System, Highway Number 3 (H-3). As population increases, congestion would also rise on the highways if no new pavement is provided. The level of service would be reduced, reflected in slower speeds and longer travel times. The test of this highway system was made to determine how much impact a policy of no highway expansion could have on inducing Marinites to use transit rather than their private autos.

TESTING THE OPTIONS

To test the performance of the various development, transit, and highway system options against one another, Phase II used the transportation model developed in Phase I of the Balanced Transportation Program.

The transportation model is a computerized technical tool able to simulate travel from one small area to another. When probable future travel patterns are known, the capacity and efficiency of alternate transportation systems can be compared with each other.

The model used in Phase II is a more refined version of the Phase I model originally developed by the California Division of Highways. In all applications prior to Phase II the model was used to produce only the projected flow of daily highway traffic. The needs of Phase II, however, required that the model be refined to include capability to forecast both highway traffic and transit usage.

The modification was accomplished by adding to the basic model a "mode-split" program, or method of calculating the probable use of highway versus transit. In addition, the model was programmed to forecast only the peak one hour of an average weekday rather than daily traffic as had been used in Phase I. With the addition of peak-hour and mode split capability, the model could be used to forecast travel flows on both the highway and transit systems.

The modified Phase II model was then "calibrated", or revised in accordance with conditions found on Marin's highway and bus system in 1971. The Technical Advisory Committee established that the model must come within plus or minus 15% in reflecting actual conditions.

Results of calibrating the Phase II model for 1971 conditions indicated that it predicted more usage than was actually observed on the

Greyhound Bus System. This was felt to be appropriate as the public image of transit is expected to improve with the new management. Experience of the Golden Gate Transit system in 1972 has confirmed that, with very little expansion of service, an improved image will increase public acceptance of transit as the model had projected.

The model was then felt to be tuned to the travel "vibrations" unique to Marin and ready to test the various transportation system options.

Transportation and Development Alternates that were fully processed through the computer model are shown in Table 3. The seven alternates shown in Table 3 represent extremes in transportation proposals ranging from the virtually no transit improvement combined with major freeway expansion of Alternate IV to the extensive transit proposals with no highway improvement of Alternate VII. Each of these alternates produced a set of operating characteristics quite different from any other. Some of the most important technical results of testing the alternates is shown in Table 4.

The Highway Lane Requirements of Table 4 are based on providing a level of highway service about the same as or slightly lower than that found in Marin in 1972. In other words, those sections of Marin roads which are congested in 1972 would continue to be congested in 1990 (with a few exceptions) and some sections of road which flow freely in 1972 would become congested as population grows. This is called Highway Level of Service "D" or only a "fair" service level.*

Should policy makers decide this level of service is too low, the highway lane requirements of Table 4 would have to be increased. Higher service levels on the highways would also decrease the use of transit, and the number of persons using transit as shown in Table

*A complete description of the concepts of "Level of Service" is given in the Phase I Report, An Evaluation of Local Plans, pages 35 thru 38.

TABLE 3
TRANSPORTATION AND DEVELOPMENT ALTERNATES

Alternate Number	Transportation System	Development System
II	Composite Highway Plan Optimum Bus and Ferry	(H-1) (TQ-1) Market Forecast BASS V-A 389,000 Population
III	Composite Highway Plan Separate Right-of-Way Bus and Ferry	(H-1) (TQ-2) Market Forecast BASS V-A 389,000 Population
IV	Regional Freeway and Expressway Optimum Bus and Ferry	(H-1) (TQ-1) Market Forecast BASS V-B 417,000 Population
V	Regional Freeway and Expressway Separate Right-of-Way Bus and Ferry	(H-2) (TQ-2) Market Forecast BASS V-B 417,000 Population
VI	Composite Highway Plan Idealized Transit System	(H-1) (TQ-3) Market Forecast BASS V-A 389,000 Population
VII	Constrained Highway Idealized Transit System	(H-3) (TQ-3) Market Forecast BASS V-A 389,000 Population
VIII	Composite Highway Plan Idealized Transit System	(H-1) (TQ-3) Countywide Plan 285,000 Population

4 would be reduced.

The above descriptions of level of service apply to all the alternatives except VII. Alternate VII was a test of an intentional policy to congest the highways in order to see how many people would be forced to use transit under such extreme conditions. The highway lane requirements shown for Alternate VII are based on a level of service much lower than found in Marin in 1972. Some sections of the Alternate VII test would operate at extremely congested conditions called Level of Service "E". On all sections of the roadway system in east Marin, Alternate VII assumes congestion would be considerably worse than found in Marin in 1972.

RESULTS OF TESTING THE OPTIONS

The highway lane requirements shown in Table 4 reveal that widening required by Alternate II thru VI would be quite substantial. The southern end of Route 101 would have to be a 10 or 12-lane freeway by 1990. Main arterials of the Ross Valley would generally require a widening of four lanes to become either six or eight-lane roadways. Other roads with significant widening needs would be Shoreline Highway, Lucas Valley Road and DeLong Avenue, all at their junction with the Route 101 freeway.

Adding the Route 17 Freeway in Alternates IV and V would produce some shifting of travel patterns. The freeway, tested in the San Rafael-San Anselmo corridor, would reduce travel demands in the parallel Sir Francis Drake Boulevard corridor from Greenbrae to San Anselmo. However, total travel through San Rafael would increase, and any reduction in city street needs would be more than replaced by freeway lanes. A spillover effect of the freeway would occur on Lucas Valley Road, which would have to become a six-lane arterial to handle additional traffic from West Marin stimulated by the full freeway system.

TABLE 4
TRANSPORTATION SYSTEMS DATA

System Requirements	1990 Alternates							1970 Data
	II	III	IV	V	VI	VII	VIII	
<u>Highway lanes*</u>								
Route 101 Freeway								
At Golden Gate Bridge**	10/12	10/12	12	10/12	10	8	6	6
In Corte Madera	10	10	10	10	10	6	8	6
In Novato	6	6	6	6	6	4	4/6	4
Shoreline Highway at Route 101	8	8	8	8	8	6	6	2
Sir Francis Drake at Greenbrae	8/10	8/10	6/8	6/8	6/8	6	6	4
Combination of 2nd thru Mission Streets in San Rafael								
Local Streets	14	14	8	8	12	10	10	10
Route 17 Freeway	-	-	6/8	6/8	-	-	-	-
Redhill Avenue at Hub	6/8	6/8	4	4	6	6	6	4
Combination of S.F.D. and Center St. at Hub	8	8	8	8	6	6	6	4
Frietas Parkway at Route 101	6	6	6	6	6	4	4	4
Lucas Valley Road at Route 101	4/6	4/6	6	6	4/6	4	4	2
DeLong Avenue at Route 101 Bypass	6	6	6	6	4/6	4	4	2
<u>Transit Equipment and Operations</u>								
Trans-Bay Bus System - Number of Buses	130	300	130	300	300	300	300	110
Annual Bus-Miles (Millions)	5.1	16.2	5.1	16.2	16.2	16.2	16.2	-
Intra-Marin Bus System - Number of Buses	20	95	20	95	350	350	350	10
Annual Bus-Miles (Millions)	1.2	4.1	1.2	4.1	12.5	12.5	12.5	-
<u>Travel Characteristics</u>								
Trips From Marin to San Francisco - Weekday Peak Hour								
Persons in Cars	10,800	10,000	10,800	10,100	9,800	9,500	7,300	8,000
Persons on Buses or Ferries	6,800	9,000	5,800	8,300	9,200	10,200	7,800	3,000
Percent on Transit	39%	47%	35%	45%	49%	52%	52%	27%
Percent San Francisco Trips of all Trips	13%	13%	11%	12%	13%	14%	12%	14%
Intra-Marin Trips - Weekday Peak Hour								
Persons in Cars	94,400	99,000	107,200	106,900	94,200	90,900	78,300	58,000
Persons on Buses	1,000	1,400	1,000	1,300	6,200	7,200	6,100	500
Percent on Transit	1.0%	1.4%	0.9%	1.2%	6.2%	7.3%	7.2%	0.9%
Percent Intra-Marin Trips of all Trips	71%	68%	70%	69%	68%	67%	69%	75%

*Assumes Level of Service "D" for all alternates except VII which assumes some routes with Level of Service "E".

**Assumes reversing lanes to accommodate peak hour flows will not be possible in 1990 due to increased reverse commuting.

The scale of the transit system which operates in combination with the highways is shown by the number of buses and annual miles of bus operation serving both San Francisco and intra-Marin needs. The large trans-bay system as designed by Kaiser Engineers for the Golden Gate Corridor Study and tested in Alternates III and V would have relatively little impact on Marin's highway lane requirements.

The reason that trans-bay transit has so little impact becomes more apparent when travel to San Francisco as a portion of total travel is examined. Peak direction travel to or from San Francisco is about only one-eighth of total trips occurring in the peak hour in Marin for all of the alternates. Attacking only this portion of total trip making will not solve the overall transportation problems of Marin. The transit system of Alternates II through V would attract no more than 1.4% of total intra-Marin trips, the same trips which make up over 2/3 of all travel in the peak hour.

The results of adding a transit system designed to serve these intra-county trips is shown by Alternates VI through VIII. Use of the service would rise to over 6% of total travel in Alternate VI and over 7% in Alternates VII and VIII. The highway lane requirements would be slightly reduced in Alternate VI but the impact of adding even the high level of intra-Marin transit service provided by the Idealized Transit System would provide relatively little reduction in the need for highway expansion. A basic principle of urban transportation becomes apparent here: Adding good transit service to relatively unconstrained highways in high travel demand corridors tends to increase total travel rather than reducing highway use.

Constraining the highways in Alternate VII, along with a good level of transit service, would significantly reduce highway lane requirements. By applying the factors of congestion to the calculation of highway lane requirements, a smaller expansion of the highway system would be needed.

Alternate VIII, the Countywide Plan test, resulted in highway lane requirements nearly the same as the constrained highways of Alternate VII. While Alternate VII would limit highway expansion by greatly congesting the highway system, Alternate VIII would result in similar highway needs by using the reduced level of land-use development proposed by the Countywide Plan and without congesting highways.

The trade-off between congested highways or controlling land-use is vividly portrayed by comparing Alternates VII and VIII. A program which successfully implements either of these possible long-range policies, planned congestion or land-use control, can result in the level of highway development shown for Alternates VII or VIII in Table 4.

TO BALANCE OR NOT TO BALANCE - SELECTING A BALANCED SYSTEM

The results of testing the seven alternates reveal major imbalances in all but one.

Use of transit within Marin in the alternates that did not include the "Idealized Transit System" was practically non-existent. Alternates II through V are, therefore, out of balance because they do not provide a transit system which offers a reasonable level of service to local Marin travelers.

Highway expansion as required in Alternates II through VI is of a magnitude to have severe environmental impacts. Despite adding good intra-county transit service to Alternate VI the resulting highway widening requirements would significantly disrupt many of Marin's local communities. All the first five alternates are, therefore, out of balance due to their need for considerable highway expansion and resulting environmental impacts.

The level of development of West Marin found in Alternates IV and V, which was accelerated by expansion of freeways to that area, would violate the basic Countywide Plan goal of keeping West Marin rural. Alternates IV and V are out of balance because of the transportation system's impact on land-use. These alternates reflect the problems of providing too much accessibility to an area.

At the opposite extreme of Alternates IV and V, which would provide too much accessibility to West Marin, would be the reduced mobility found in Alternate VII. Alternate VII tested a policy of allowing the highway system to congest in an effort to increase transit use, which would result in a certain loss of mobility. Transit use would indeed increase, but even the best intra-Marin transit service that can be projected within known technology would not be able to provide the freedom of movement the 1972 highway system allows.

The level of congestion found in the Constrained Highway System (Alternate VII) would severely restrict movement and thereby reduce access to opportunities that are important in the quality of life in Marin. Alternate VII is out of balance because it would not provide a reasonable level of mobility. As shown by the Countywide Plan test, Alternate VIII, this restriction in mobility is not necessary if the land-use development goals of the Countywide Plan are implemented.

The alternate that best meets all the criteria of a Balanced Transportation Plan is the Countywide Plan test, Alternate VIII.

THE BALANCED TRANSPORTATION PLAN

Land-Use System

The land-use of the balanced transportation plan is the controlled development patterns of the Countywide Plan. Urbanization would be

successfully contained to the eastern section of the county and limited to a population of 285,000 by 1990. A simplified version of the Countywide Plan land-use structure and related transportation corridors is shown in Figure 5.

Public Transit System

The public transit system needed to support this level of development would include three major components. Although described separately here, these systems would be integrated into a total transit system that would be comprehensive, without overlapping service, and without competition among the subsystems for public support. The transit system is shown in Figure 6.

A trans-bay bus system, similar to that designed by Kaiser Engineers for the Golden Gate Corridor Study, would be the first major component. This system would be implemented in separate but coordinated steps between now and 1990. Each step would add or replace equipment or build new exclusive busways until the total system of approximately 300 buses and 22 miles of north-south busway is complete. Initial stages of this system are now being operated by Golden Gate Transit and immediate steps are needed to begin exclusive lane operation for these buses on the Route 101 freeway. As the freeway is widened, the new lanes should be reserved for bus or carpool use, with cars to be excluded as the growth in transit vehicles fills the lanes to capacity. Such use to be terminated only when the parallel exclusive bus right-of-way is complete. The ultimate location of the separate bus right-of-way should be as far from the Route 101 corridor as Marin's topography will allow. Use of Route 101, however, appears to be the most feasible alignment as long as conventional buses are the primary transit vehicle.

A second component is the Trans-Bay Ferry System. The existing service to Sausalito and Tiburon would be supplemented in stages with new service to Larkspur initially and ultimately to Las Gallinas Creek as well. A further extension to the Petaluma River is also a possibility but commuter use of such a service would be minimal in 1990. Use of ferry service for non-commute purposes would be a logical topic for inclusion in the proposed Recreational Travel Study of Phase III.

The third component of the transit system is the very important intra-Marin bus service. As has been pointed out earlier, travel to San Francisco is only about one-eighth of total travel in Marin in the peak hour. The intra-county system is designed to attract many of intra-county trips which account for two-thirds of all travel. The system as planned would include about 350 buses, at least 200 of which should be of the "mini-bus" 20 passenger category. The smaller buses are more attractive to passengers, less disruptive to residen-

MARIN COUNTY BALANCED TRANSPORTATION PROGRAM PHASE II

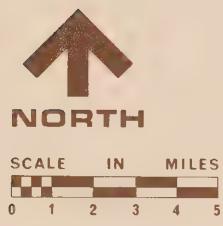
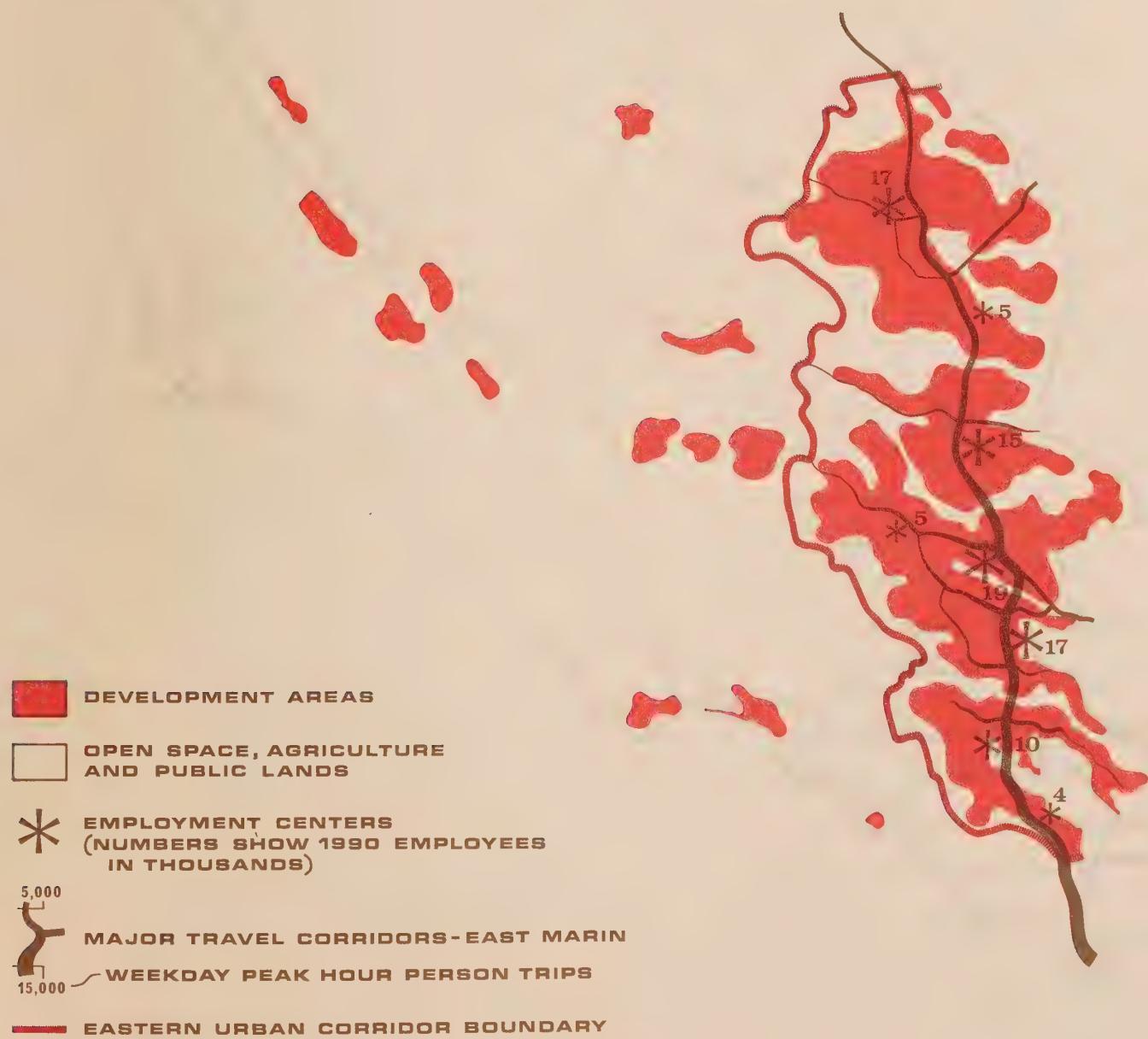


Figure 5



LAND USE AND TRAVEL PATTERNS COUNTYWIDE PLAN

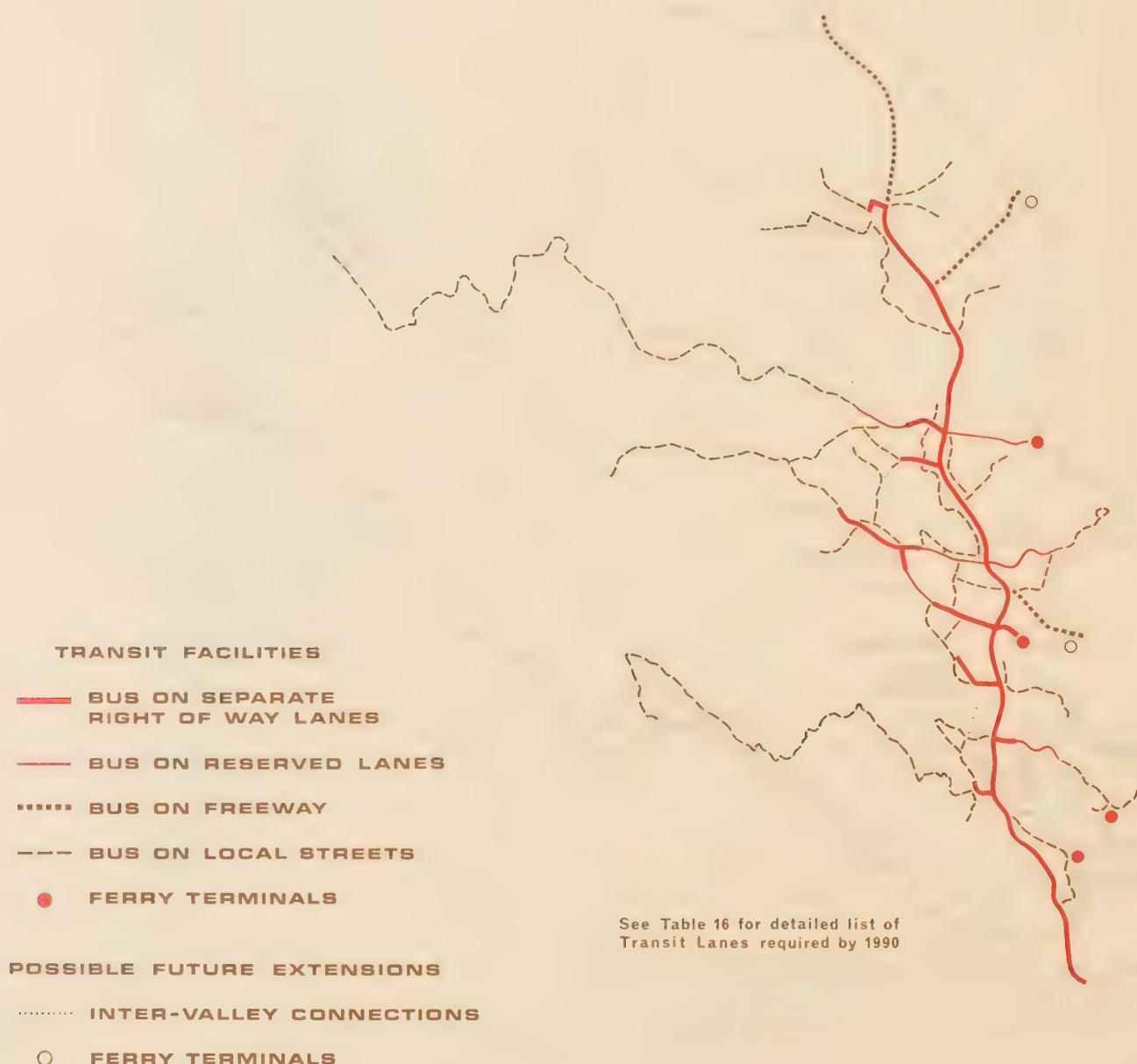
MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II



NORTH

SCALE IN MILES
0 1 2 3 4 5

Figure 6



1990 TRANSIT SYSTEM
BALANCED TRANSPORTATION PLAN

tial neighborhoods, capable of deeper penetration into neighborhoods, and more suited to low volume service which will be found on many of the intra-county routes. The small buses are able to reach within walking distance of many more homes than is possible with large standard coaches.

The intra-county bus system would operate on many sections of east-west busway in addition to deeply penetrating the neighborhoods. Approximately 11 miles of grade separated busway along with 12 miles of exclusive bus lanes would be included in the intra-county system. In some cases buses would have exclusive use of new lanes provided by highway expansion. Exclusive bus lanes are obviously impractical on two-lane roads, and thus widening major arterials to four lanes will be necessary to provide special bus facilities. Some of the new four-lane arterials would operate with two lanes for autos and one for buses only in the peak direction with only one lane for autos and buses serving the opposing traffic flow.

This system should provide most residents of east Marin with a bus passing within walking distance of their home every five to ten minutes in the peak hour.

Highway System

The capacity of the highway system would be expanded 14% by 1990, with the addition of 87 lane miles. Many of these new lanes would be used exclusively by transit as was explained above. The highway system is shown in Figure 7. No new freeways are proposed in the plan. Conversion of Route 101 north of Novato, now a four-lane expressway, to full freeway standards is recommended for safety reasons.

Routes on new alignments are proposed as follows:

The San Rafael Waterfront Parkway from Point San Quentin to South San Pedro Road with a connection to Bellarm Boulevard.

Smith Ranch Road upgraded and extended to the Ferry Terminal on Las Gallinas Creek.

A connector from Lucas Valley Road to White Hill.

Each of these routes pass through urban open space belts shown in the Countywide Plan. It is recommended that none of these routes be built until the urban open space is permanently secured.

Arterial routes proposed or adopted by various jurisdictions or groups NOT recommended for inclusion in the Balanced Transportation Plan are listed in Table 5.

The highway system includes an eight-lane Route 101 freeway from the Golden Gate Bridge to Route 37, six lanes to Gross Field and four lanes to the Sonoma County line. An exclusive bus lane should operate on the freeway until a parallel transit way is constructed. At that time Marin will have the option of continuing exclusive lane

TABLE 5

ADOPTED OR PROPOSED ARTERIAL HIGHWAY EXPANSION
NOT INCLUDED IN THE BALANCED TRANSPORTATION PLAN

Route 17 as a freeway west of Route 101.
Route 37 as a freeway west of Route 101.
Arterial connection to Route 101 at Rodeo Avenue in Sausalito.
William Avenue Extension in Corte Madera and Larkspur.
San Francisco Avenue Extension to a ridge top road or across the ridge to Terra Linda from San Anselmo.
Frietas Parkway connection to ridge top road or across the ridge to Butterfield Road from Terra Linda.
Butterfield Road connections to Terra Linda or Lucas Valley.
Ignacio Boulevard Extension through Indian Valley Colleges Campus.
Rowland Boulevard between Route 101 and Olive Avenue.

operation for transit or converting to a full eight lanes for automobiles. In order to assist the freeway to operate at peak efficiency, ramp metering should be operated at all interchanges from the Golden Gate Bridge to Novato. Implementation of the exclusive bus lane can begin immediately as a bus and carpool lane and continue in stages as new lanes are added to the freeway until a full eight-lane roadway is completed to Route 37.

Arterial road widening for both increases in highway capacity and exclusive use by buses is recommended to bring the major arterials of east Marin to at least four lanes by 1990. Some sections of six-lane arterials will be needed, primarily as short connections from major traffic generators, such as the Northgate and Bon Air Shopping Centers, to the Route 101 freeway. A longer section of a six-lane arterial is recommended the major east-west corridor of east Marin from San Rafael, through the Hub, to Fairfax. West of the Hub, the six lanes would be a combination of Sir Francis Drake Boulevard and Center Boulevard. Figure 7 shows recommended arterial capacity throughout Marin.

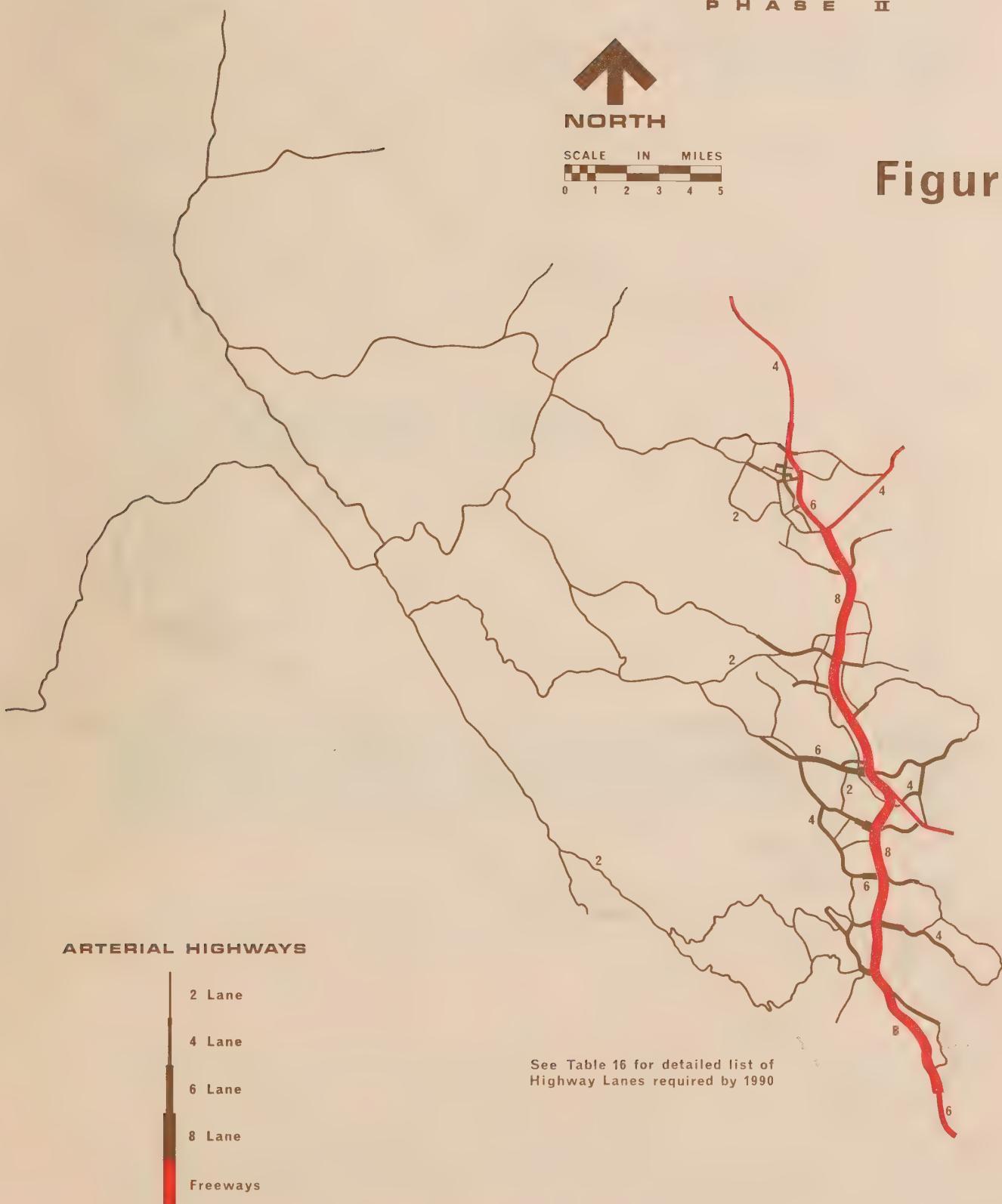
MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II



NORTH

SCALE IN MILES
0 1 2 3 4 5

Figure 7



1990 HIGHWAY SYSTEM
BALANCED TRANSPORTATION PLAN

IMPLEMENTATION

What happens if the Balanced Transportation Plan is not implemented?

How much will it cost to buy a Balanced Transportation System?

The consequences of not implementing the Balanced Transportation Plan must be understood before the costs, a hard pill to swallow in conjunction with any public investment, are discussed.

THREE POSSIBLE FUTURES FOR MARIN

Three of the alternates discussed briefly above can be used to portray Marin County of 1990, based on three different degrees of plan implementation.

The first of these assumes the policies of the Countywide Plan are not followed to any significant degree. The highway system would expand on demand in response to increases in travel needs in an attempt to provide as near to "free-flowing" highways at peak hour as possible. No new freeways would be built, as each community would object to new routes. A good level of trans-bay transit would be built by the Golden Gate Bridge District to serve commute needs, but little is done for intra-county transit. The development of the county, controlled by the real estate market, would reach nearly 400,000 people spread over both east and west Marin by 1990. This is the Marin of a "Continuation of Current Trends", described by the results of Alternate III.

In the second possible Marin of 1990 the county would have committed itself to balancing the modes of transportation but would not have quite gotten a handle on the pace of development. A large intra-county, as well as trans-bay, transit system would be provided to move the nearly 400,000 populace but there would be little reduction

in needed highway expansion. Alternate VI describes a Marin committed to "Balanced Modes Without Land-Use Controls".

The third possible Marin assumes the Countywide Plan becomes a reality. Development would be channeled into east Marin at a controlled rate such that public service facilities would be able to keep pace with new growth. Highway and transit facilities would be developed to a level commensurate with land development. This Marin is described by the "Balanced Transportation Plan", Alternate VIII.

WHAT DO THESE THREE FUTURES FOR MARIN REALLY MEAN?

In order to develop an understanding of what each of these alternative futures for Marin would mean, a detailed comparison of certain important transportation system characteristics can be made.

Total Travel - This is the total number of persons moving in Marin, multiplied by their length of trip on an average weekday at peak hour. Table 6 shows the growth in total travel is greater than the growth in population.

TABLE 6

GROWTH IN TOTAL TRAVEL AND POPULATION

	1972	1990 Alternates		
		III	VI	VIII
Total Travel, Person-Miles (Weekday peak-hour)	700,000	1,321,000	1,321,000	1,091,000
Growth Factor from 1972	-	1.89	1.89	1.56
Population	210,000	389,000	389,000	285,000
Growth Factor from 1972	-	1.85	1.85	1.36

The Population growth found in Alternate III and VI would create the most travel by 1990 while the Countywide Plan, Alternate VIII, would

produce the least travel demand. Total travel is a measure used to evaluate overall pollution and other environmental effects of the transportation system.* Minimizing total travel without sacrificing urban mobility is an important achievement of the controlled growth policy of the Countywide Plan.

Use of Transit - This is the percentage of all persons traveling in the weekday peak hour who will choose to use transit instead of their automobile. Use of transit as found in the Countywide Plan test at important points in the transportation system is shown in Figure 8. Overall transit use for 1972 and the three possible future Marins is given in Table 7.

TABLE 7				
USE OF TRANSIT				
Percent of Total Persons Using Transit	1972	1990 Alternates		
		III	VI	VIII
To San Francisco	31%	47%	49%	52%
Intra-Marin	0.9%	1.4%	6.2%	7.2%

Again the Countywide Plan, Alternate VIII, is superior in its ability to attract people from their autos to transit. The plan emphasizes travel within Marin -- travel which is very difficult to attract to transit because of its short length, the availability of free parking, and many dispersed destinations. Nevertheless, the plan development pattern would still be more serviceable by transit than the sprawl patterns which would cover Marin if the real estate market operated without control.

*An innovative study on the impact of alternate transportation systems on the air quality of the San Rafael and Ross Valley areas has been prepared by the Bay Area Air Pollution Control District using technical transportation data of Phase II. The District's report, entitled Marin County Air Pollution Planning Study, is available at the Marin County Planning Department. The study results could not be included in this report due to publication deadlines, but an abstract of the study will be part of the transportation section of the forthcoming Countywide Plan.

The air quality study concludes that the basins of east Marin have a very great potential for air contaminant accumulation and recommends that implementation of balanced transportation and controlled growth policies will be required to avoid intolerable levels of air pollution by 1990.

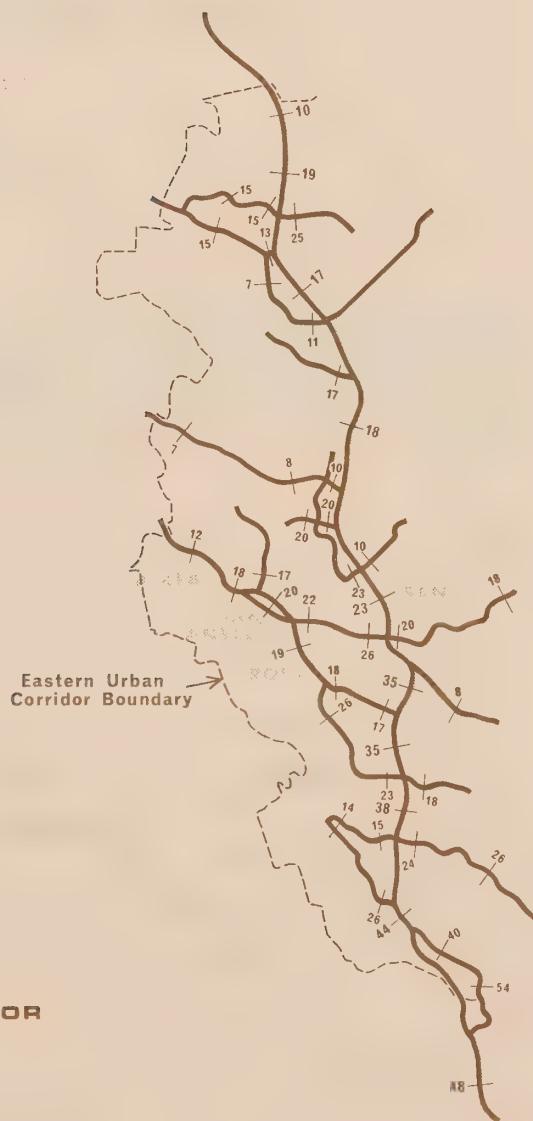
MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II



SCALE IN MILES
0 1 2 3 4 5

Figure 8

Use of Transit is generally less than 5% of total travel on all routes not in Eastern Urban Corridor.



10 PERCENT OF TOTAL TRAVELERS USING
TRANSIT SYSTEM ALONG SELECTED MAJOR
TRAVEL ROUTES OF EASTERN URBAN
CORRIDOR ONLY

WEEKDAY P.M. PEAK HOUR DATA

USE OF TRANSIT
BALANCED TRANSPORTATION PLAN

An important principle of making mass transportation successful is apparent here: A concentration of development into fairly compact rather than sprawl type patterns is needed in order to bring the transit system close to as many residences and other land-uses as possible and thereby increase its potential users.

Phase II technical testing confirms that the Countywide Plan would be the most successful development pattern in increasing the use of transit.

Expansion of the Highway System - An overall measure of highway system capacity can be made in terms of lane-miles. This is the number of lanes a segment of highway may have, times the length of that segment in miles.

TABLE 8
CAPACITY OF ARTERIAL HIGHWAYS

	1972	1990 Alternates		
		III	VI	VIII
Capacity of Arterial Highways in Marin (Lane-Miles)	645	787	771	732
Percent Increase in Highway Capacity from 1972	-	22%	20%	14%

The Countywide Plan calls for the least expansion of the highway system. The 14% expansion of highways would, in combination with the recommended expansion of the transit system, be able to accommodate the plan's 36% growth in population by 1990.

In terms of specific facilities, both Alternate III and VI would require a second deck on the Golden Gate Bridge for automobiles, despite an excellent transit link to San Francisco. The Countywide Plan would require no expansion of the Bridge.

The Route 101 freeway would have to be a 10 or 12-lane facility as far north as Lucas Valley in Alternate III and VI while the Countywide Plan recommends expansion of 101 to only eight lanes. Other major arterials would be similarly limited in expansion by the plan as compared to other alternates. Clearly, in terms of the above transportation system characteristics and environmental impacts, the Countywide Plan is more desirable than a "Continuation of Trends" or "Balanced Modes Without Land-Use Controls" alternates.

But how much will it cost?

TRANSPORTATION SYSTEM CAPITAL FINANCING

The costs of both highway and transit systems were developed for each of the possible future Marin alternates from both county and outside agency sources. Work for the Golden Gate Corridor Study was particularly valuable in estimating trans-bay system financing requirements.

The first set of costs which normally come to mind are the costs of actually building the system or the capital costs. An important assumption has been made with regard to the capital costs shown in Table 9. These costs are assumed to be expanded in a relatively even flow until the various systems are complete by 1990.

In order to keep transit and highway systems costs most nearly comparable, the trans-bay transit costs are for only those portions of the trans-bay system within Marin. Trans-bay bus vehicles and Ferry System costs are totally allocated to Marin as is, of course, intra-Marin bus costs.

Although the Countywide Plan test shows a considerably reduced total cost as compared with the other future Marins, an expense of over one half a billion dollars is an awesome figure. What are the resources available to buy such a major system?

TABLE 9

1990 TRANSPORTATION SYSTEMS CAPITAL COSTS
 FLOW OF FUNDS REQUIRED TO 1990
 IN MILLIONS OF DOLLARS

System Components	1990 Alternates		
	III	VI	VIII
Highway	\$413	\$366	\$230
Transit			
Trans-bay			
Bus*	\$235	\$235	\$235
Ferry	49	49	49
Intra-Marin Bus	—	47	47
Transit Subtotal	\$284	\$331	\$331
Total System Costs	\$697	\$697	\$561

* Costs for Marin portions of busway only. Golden Gate crossing and San Francisco busway add \$589 million to total.

Sources of capital funding for highways, shown in Table 10, are based on the flow of gas taxes currently available to Marin and expanded at the rate of the increase in driving to 1990 for each alternate.

Transit resources are based on federal grants matching local funds as is being done currently by the Golden Gate Bridge District in the purchase of its existing bus fleet. Table 10 shows these resources based on the current formula: The federal grant is two-thirds of the total system costs. An expansion of the program to federal participation at the 90% level, now being actively considered, would considerably expand Marin's potential financial resources.

TABLE 10
1990 TRANSPORTATION SYSTEM
CAPITAL RESOURCES AND DEFICITS BY 1990
FLOW OF FUNDS TO 1990 IN MILLIONS OF DOLLARS

System Components	1990 Alternates		
	III	VI	VIII
Capital Resources			
Highway System	\$150	\$147	\$131
Transit System			
Trans-Bay*	194	194	194
Intra-Marin	126	120	108
Transit Subtotal	\$320	\$314	\$302
Total System Capital Resources	\$470	\$461	\$433
Capital Deficits by 1990			
Highway System	\$263	\$219	\$ 99
Transit System			
Trans-Bay	90	90	90
Intra-Marin (Surplus)	(126)	(73)	(61)
Transit Subtotal	(\$36)	\$ 17	\$ 29
Total System Capital Deficiencies	\$227	\$236	\$128

*Assumes the resources available based on a Golden Gate Bridge District revenue bond are allocated to Marin in proportion to Marin's share of total capital cost of trans-bay system.

Local resources for transit are based on the revenue bonding capacity of the Golden Gate Bridge District, assuming a doubling of the auto toll. This was estimated to be \$155 million in the Engineering Report to the Golden Gate Corridor Study. Intra-Marin local resources are based on the sales tax on gasoline which will become effective on July 1, 1972 and provide a potential flow of funds of over \$35 million by 1990.

The capital resources summarized in Table 10 are all available to Marin, but in varying degrees of probability. The highway funds are guaranteed by the State Constitution at this time and will vary only based on the amount of driving done in Marin. Transit resources, however, are considerably less secure. A determined effort will have to be made by Marin and the region if these funds are to be made available. Current experience at the Golden Gate Bridge District indicates that a determined effort can yield federal support.

The deficits section of Table 10 reveals that even with major capital grants from federal agencies, the proposed transportation systems for Marin would not be totally funded. An expansion of the federal grant program, now being considered by the Department of Transportation, is needed to fully fund Marin's needs by 1990.

With a modest expansion of the federal grant program for transit, to 75% federal participation, Marin's transit capital costs can be met. The highway system, however, would not be so readily financed. Much highway expansion is proposed for exclusive use by bus and as such is needed as part of the overall transportation system. An expansion of the funds collected for highways is needed to keep pace with ever escalating costs of construction. It appears that highway user fees should not fall below their current share of the price of gasoline, or about 30%.

It appears that with a determined effort to secure federal aid and increase the funds collected for highways the Balanced Transportation Plan can be built.

The Marin of a "Continuation of Current Trends" would be unfunded under current financing arrangements by an amount almost double that of the Balanced Plan. The "Commitment to Transit Without Land-Use Controls" alternate is even greater trouble from a capital funding

viewpoint. Alternate VI reveals the futility of emphasizing a program of balancing the modes of transportation without controlling the pace and place of development.

The Countywide Plan alternate shows a balanced development and transportation system is the least expensive to build.

How much will it cost to operate a Balanced Transportation System?

FUNDING THE OPERATION OF THE BALANCED SYSTEM

The operating costs of transportation system are normally stated only in terms of the public costs of operations. This is logical in the sense that the reports of these costs are usually to public agencies concerned only with their own cash flow problems. There is, however, a very large cost, not in the public sector, which should be considered in an overall system evaluation. This is the money paid by each individual Marinite when he operates his private automobile or truck. Private, as well as public operating costs must be considered to get a complete picture.

Operating costs for both transit and highway systems have been estimated for a one year period, 1990.

Transit Operating Costs

Operating costs of the trans-bay bus and ferry systems, along with the intra-Marin bus system were developed based on escalating current experience on the Golden Gate Transit System to 1990. Total annual service in terms of bus-miles was multiplied by an average cost of operating a bus per mile.

TABLE 11
BUS OPERATIONS

Annual Miles of Operation (Millions)	1990 Alternates		
	III	VI	VIII
Trans-Bay Bus	16.2	16.2	16.2
Intra-Marin Bus	4.1	12.5	12.5

Cost per bus mile of the intra-Marin system was slightly less, because about 60% of the local bus system was found to require only a 20-passenger 'mini-bus', compared to the current 45 passenger trans-bay coaches. Average loadings per bus indicate the desirability of having a smaller bus on local service.

TABLE 12
AVERAGE BUS LOADINGS

Average Passengers per Bus-Weekday Peak Hour	1990 Alternates		
	III	VI	VIII
Trans-Bay Bus	33	31	27
Intra-Marin Bus	6	11	10

A cost of ferry system operations was based on expanding estimates made for the Golden Gate Bridge District by Spaulding and Associates to include a four-terminal, nine-vessel operation by 1990.

Highway Operating Cost

The private cost of operating the 1972 Highway System in Marin was estimated as follows:

125,000 registered vehicles x 12,000 miles per year x \$0.10 per mile equals \$150 million annually.

This cost is obviously only an estimate, but its magnitude is important to keep in mind when comparing it to the operating cost of public transit. The Golden Gate Transit System is estimated to cost about \$7 million to operate in 1972.

The cost of operating the highway system in 1972 was escalated to 1990 by the rate of increase in driving plus a 5% annual inflation factor. Added to this is the relatively modest public cost of maintaining the highways, estimated to be \$10 to \$12 million annually by 1990.

Transportation system operating costs are shown in Table 13.

TABLE 13
TRANSPORTATION SYSTEM OPERATING COSTS
PLAN YEAR 1990
1990 Millions of Dollars

Component	1990 Alternates		
	III	VI	VIII
Highway System			
Public Maintenance	\$ 12	\$ 11	\$ 10
Private Operating	680	651	528
Highway Subtotal	\$692	\$662	\$538
Transit System			
Trans-Bay Bus	\$ 49	\$ 49	\$ 49
Ferry	15	15	15
Intra-Marin Bus	11	35	35
Transit Subtotal	\$ 75	\$ 99	\$ 99
Total Transportation System	\$769	\$761	\$637

Table 13 reveals that a net savings to Marinites can be realized despite increasing public subsidies for transit. Comparing Alternates III and VI shows that the additional public cost of operating the transit system can be offset by the reduction in the private costs of highway system operation.

Use of the private system costs makes the scale of public fund requirements more palatable. However, the operating costs for the transit system will still have to come from public resources, which will require political support.

What are the resources to offset the public costs?

SOURCES OF PUBLIC TRANSIT OPERATING FUNDS

A person makes a choice to drive or ride according to the "perceived" cost of driving -- the out-of-pocket costs such as fuel, tolls, and parking -- rather than the higher actual costs of car operation and depreciation. Therefore, operating revenues for each of the systems have been based on a fare structure which appears to the individual rider to be less than the cost of driving his car in order to make transit competitive. This means revenue can be collected at only two cents per mile for intra-Marin travel and about eight cents a mile for trips crossing the Golden Gate.

Revenue from the ferry system was based on updating estimates done for the Golden Gate Bridge District by Balanced Transportation Program projection of commuter use in 1990 and adding the estimate of recreational usage done by Spaulding and Associates.

Other sources of operating funds are based on the Sales Tax on gasoline to be collected as of July 1, 1972 and the Marin County Transit District's current rate of property taxations.

TABLE 14

 FINANCING TRANSIT SYSTEM OPERATIONS
 PLAN YEAR 1990
 1990 Millions of Dollars

System Component	1990 Alternates		
	III	VI	VIII
Sources of Operating Financing			
Operating Revenues			
Trans-Bay Bus	\$47.7	\$54.9	\$47.2
Ferry	9.4	9.4	9.0
<u>Trans-Bay Subtotal</u>	<u>\$57.1</u>	<u>\$64.3</u>	<u>\$56.2</u>
Intra-Marin Bus	0.5	2.4	2.3
Sales Tax for Transit Use	1.0	1.0	0.9
Marin County Property Tax	0.7	0.7	0.7
<u>Local Resources Subtotal</u>	<u>2.2</u>	<u>4.1</u>	<u>3.9</u>
Total Revenues	\$59.3	\$68.4	\$60.1
Net Operating Deficit (Surplus)			
Trans-Bay	\$ 6.9	\$ (0.3)	\$ 7.8
Intra-Marin	8.8	30.9	31.1
<u>Total Deficit</u>	<u>\$15.7</u>	<u>\$30.6</u>	<u>\$38.9</u>

Table 14 reveals what appears to be the most difficult problem in financing the implementation of a Balanced Transportation Plan. Operating costs far outstrip any current sources of operating revenues. This is particularly true for intra-Marin transit, where over a 90% subsidy is needed. At this level of subsidy a no-fare system should be considered, with the total cost of operation borne by the public.

The trans-bay bus system may be able to cover the cost of operation from the fare box, particularly if auto tolls are raised to provide for increased revenue bond capacity and a parallel increase in transit fares can then be made without loss of bus patronage. The frustration of parking and congestion in San Francisco will keep the use of trans-bay buses at a high level even with moderate fare increases.

Local Marin jurisdictions will be primarily responsible for the huge subsidy need to operate the intra-Marin transit system. There are two possible sources of funds to offset operating losses shown for the intra-Marin system: Taxes on auto fuel allocated to operating subsidies, and/or increased property taxation.

A mythical gasoline price and tax structure which would provide funds needed for both highway and transit expansion in 1990 is shown in Table 15.

TABLE 15
AUTOMOBILE FUEL COSTS AND TAXATION

Item	Existing in 1972	Needed in 1990
Price of Fuel (average)	22 cents	55 cents
Taxes Collected for:		
Highway	11 cents	22 cents
Transit		
Capital Project	1.1 cents	8 cent sales tax
Operations	0.2 cents	15 cents
Total	34.3 cents	\$1.00

This arrangement would raise the taxes on fuel from about 55% as of July 1972 to over 90% in 1990. The 1990 tax rate would about equal that of other industrialized countries, which in 1972 taxed auto use much more heavily than the United States does.

Property taxes could also be used to cover the operating subsidy, as is now done in San Francisco. The required tax rate would be about \$2.21 per \$100 assessed valuation in 1990 dollars or \$1.92 per \$100 assessed valuation in 1972. This rate is comparable to the \$1.55 per \$100 assessed valuation paid in 1972 by San Franciscans for the Municipal Railway subsidy and construction of the Bay Area Rapid Transit system.

This property tax rate reflects the level of commitment local jurisdiction will have to make if a high level of low fare intra-county service is to be provided. Existing transportation finance will obviously have to be restructured to provide the large amounts of operating subsidy required by a low fare or no fare intra-Marin transit system -- and the provision of such a system has been shown to actually reduce the total cost of operating a transportation system in Marin.

CONCLUSION: FINANCING BALANCED TRANSPORTATION

The benefits of the Balanced Transportation Plan are readily apparent, in terms of environmental impacts. The capital costs of the Balanced System are considerably less than a "Continuation of Current Trends" or "Balanced Modes Without Land-Use Controls" alternates. Even the operating costs, when highway as well as transit costs are considered, are least for the Balanced System.

It is therefore, recommended that the county actively pursue the implementation of the Balanced Transportation Plan in logical programmed steps. Each step will depend on the active seeking of federal grants for capital improvements. Additional effective lobbying at the State Legislature and Congressional levels will be necessary to cover public transit operating subsidies. The Congress and State Legislature may also have to be petitioned to provide additional resources for highway system expansion.

As difficult a task as funding the Balanced Transportation Plan may appear to be, the costs of not controlling development and then attempting to provide transportation service to the resultant burgeoning sprawl have been shown to be far greater from both economic and environmental viewpoints.

The first motor fuel tax funds specifically allocated for public transit and not tied to local property taxation become available July 1, 1972. These funds will provide the base for the first steps toward the Balanced Transportation Plan. Further implementation will require aggressive action on the part of the people of Marin in order to provide the total required financing.

Although active seeking of finances is a very necessary step in implementation of the Balanced Transportation Plan, caution should be used to avoid over extension into any single system or technology. It is recommended that Marin not commit itself to any system totally, so that a shift in policy direction would be difficult or impossible to make. In other words, although the recommended systems are felt to be the best solution now available, it is quite likely that innovative transit systems, as well as automated highways, will be near a reality by 1990. Marin should never be so committed to any single solution such that the acceptance of something better is impossible due to resources being tied up in an outdated concept. Leaving the options open and employing the latest in technology, while still moving ahead in logical incremental steps, is the route to balanced transportation.

TECHNIQUES OF IMPLEMENTATION

Level of Development

The provision of certain types or levels of transportation service by public agencies can have a strong influence on the type of development pattern that will emerge.

Most important of these techniques is providing transportation facilities to only those areas where development is desired. The impact of providing freeway access to West Marin has been discussed earlier and found to stimulate development in direct opposition to County-wide Plan goals.

The basic concept is to scale the capacity of the transportation system to the travel needs of a desirable level of development.

Beyond the rejection of extending Routes 17 or 37 as freeways to West Marin there are two other specific areas where transportation facilities can be used to assist in the implementation of the County-wide Plan.

● Route 101 North of Novato

North of Gnoss Field in Novato the Countywide Plan calls for urban open space or continued agriculture. Route 101 in this area is now an expressway but is recommended for conversion to a limited access freeway for safety reasons. It is further recommended that on conversion to full freeway, no inter-changes be provided between Gnoss Field and the Sonoma County line. This section of Route 101 would become a four mile stretch of freeway passing through a recommended open space area, without providing access to the area. A local road system would be developed to provide access to any remaining agricultural activities. The transit system parallel to Route 101 in this area would also provide no access to the open space.

● Golden Gate Crossing

Control of the Golden Gate Crossing is another transportation facility which can help guide development patterns. The Countywide Plan goals of controlling the pace of development and making Marin more self-sufficient economically can be served by limiting the expansion of the capacity of the Golden Gate Bridge.

Results of testing the Countywide Plan indicate the travel demand to San Francisco in the peak period will grow, but not nearly as rapidly as would occur with an uncontrolled real estate market and a Golden Gate Crossing with unlimited capacity. In the 1990 Countywide Plan test about 50,000 commuters from both Marin and Sonoma would cross to San Francisco, as compared to about 33,000 in 1972. This number would grow to 75,000 if the real estate market develops a predominantly residential Marin.

Flows of commuters to and from Marin in 1972 and for both a County-wide Plan and uncontrolled growth pattern in 1990 are shown in Figure 9.

About half of the plan's 50,000 commuters are projected to use transit, leaving an auto commuter flow about equal to 1972. This number of auto commuters could be accommodated in just three lanes of auto traffic if car pooling increased 25% by 1990. An increase in car pooling appears quite possible in light of the ever increasing costs of parking and congestion in downtown San Francisco. It would then be possible to operate the bridge with three auto lanes and one exclusive bus lane in the peak direction. Off-commute flow would be served by only two lanes of traffic discouraging in-commuting to Marin and thus making Marin jobs more available to Marin residents. This plan of bridge operation would provide an increased level of transit service, offsetting the reduction in the highway level of service.

It is, therefore, recommended that NO second deck be added to the Golden Gate Bridge for either automobiles or transit vehicles. The people moving capacity of the bridge should be increased at a controlled rate by providing an exclusive bus lane on the existing six-lane deck in the peak direction of traffic flow. A first step to implementing this method of bridge operations which can be put in service immediately is a reserved lane for both buses and car pools. As the bus fleet grows, car pools could be excluded from a bus-only lane.

Limiting the expansion of the Golden Gate Crossing to bus transit will serve the goals of the Countywide Plan. A high capacity transit link across the Golden Gate would be much the same as an increase in auto capacity in that either would make the implementation of a controlled rate of growth in Marin more difficult to accomplish.

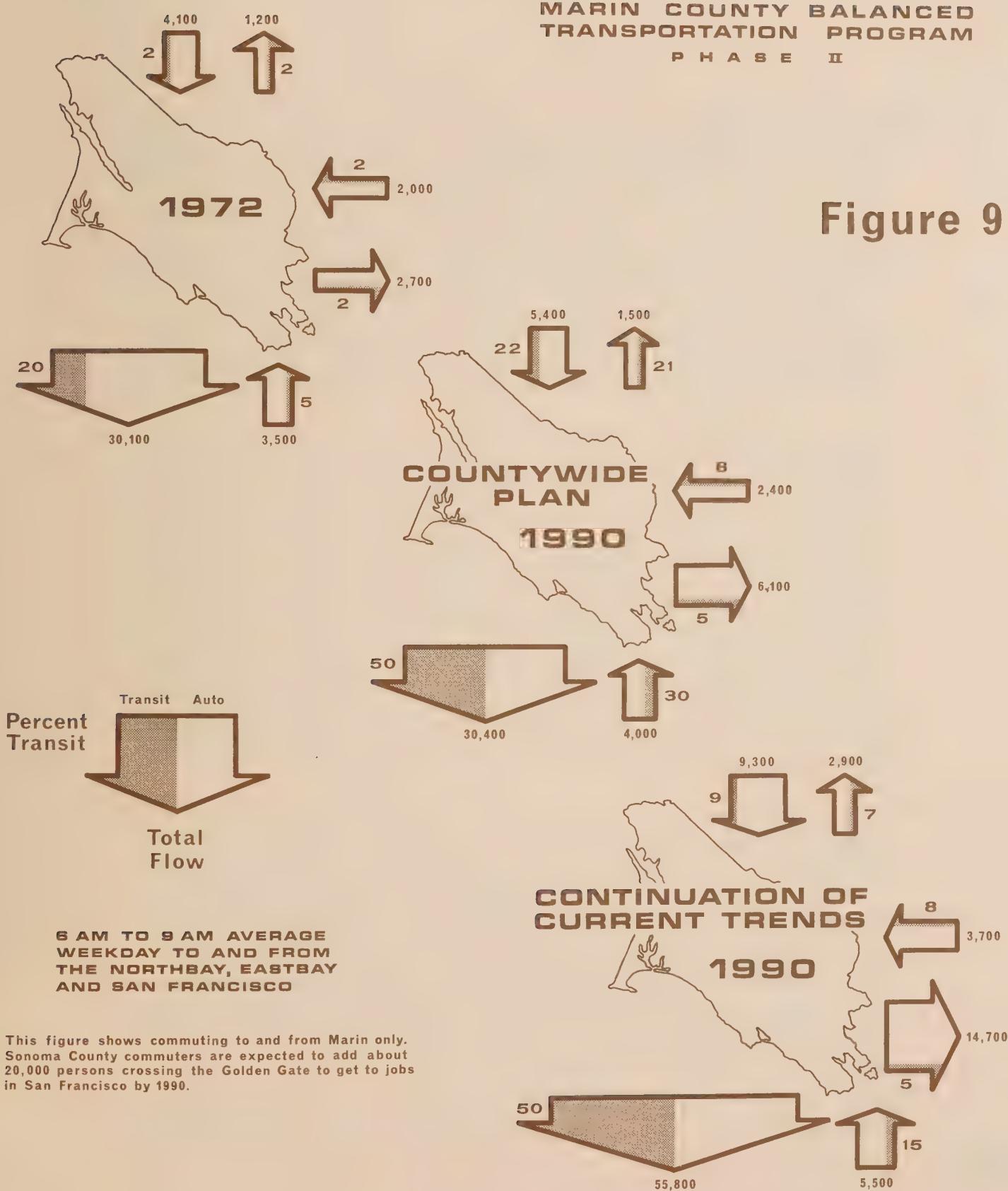
Not expanding the capacity of the crossing is felt to be an appropriate recommendation with regard to weekend traffic as well. As San Francisco can tolerate no more autos in its downtown area on weekdays, neither can Marin afford to have an ever increasing flow of autos to recreational sites on weekends. Phase III of the Balanced Transportation Program will study the problems of recreational travel in detail.

Making Transit Work

Beyond finding the resources to make a comprehensive transit system become a reality, there are a series of techniques involving land-use development controls which can help the transit system perform at its greatest potential.

MARIN COUNTY BALANCED
TRANSPORTATION PROGRAM
PHASE II

Figure 9



FLows OF COMMUTERS

● Land-Use Pattern

The overall land-use pattern should be concentrated rather than dispersed. Locating homes and offices within walking distance of transit service has a definite impact on the degree of transit usage. The test of the Countywide Plan showed that the plan's land-use developed greater transit usage than the other alternate's due to the plan's locating potential users closer to transit service. This was true even though the plan emphasized hard-to-serve short local trips.

It should be noted that the Countywide Plan as tested in Phase II did not assume higher local neighborhood densities than the uncontrolled land-use pattern was projected to develop. The plan would exclude development from the urban open space areas, generally impossible to serve by transit.

If the above open space plan is not implemented, the new people that locate in these areas will be virtually forced to use their autos.

Although the plan's land-use would not increase local neighborhood density and still would achieve some success in increasing the use of transit, this does not mean that higher density could not further stimulate transit use. The density of local neighborhoods is more properly set by general planning criteria, rather than transit service potential. However, once these standards have been established, the higher density arrangements should be allowed only in areas where transit service exists or can be easily provided. Typically, the highest level of transit service can be provided along major travel corridors, and thus high density development should also follow the patterns of major arterials. As the potential for transit service drops off away from major arterials, lower density development becomes more logical.

● Residential Areas

Each land developer should be required to file a report on how his proposal will relate to existing or potential transit service. If no transit service is within walking distance ($\frac{1}{4}$ mile) and the density proposed is greater than single family units, an extension of service would have to be worked out with the Marin County Transit District before the development was approved. The design of any new development should include facilities for transit such as loading zones, shelter, and good paths from housing to bus loading points. Separation of bus and auto routes might be appropriate for some developments.

● Commercial and Employment Centers

A key factor in the amount of success transit has in attracting users

on the commute runs to San Francisco is the lack of parking in downtown. A strategy for making transit work can be based on the amount of parking provided. It is assumed that parking at residences should continue to be provided, leaving the other end of the trip as the primary point to develop parking controls.

Employment centers such as large governmental buildings or industrial parks would seem to offer the greatest potential for the beginning of a "no-parking" strategy. Because the travel by employees is generally on uniform schedules and usually without a great deal of baggage, their home-to-work travel needs can be easily served by transit. It is recommended, however, that no reduction in parking be attempted until a very high level of transit service has been implemented.

The "sea of asphalt" surrounding the Marin County Civic Center might be a logical place to begin the constrained parking policy. Following initiation of a good bus service, the Civic Center parking area could be gradually decreased.

Serving commercial areas by transit rather than auto is more difficult because of the bulky packages purchased by shoppers. The thought of hauling a week's supply of food onto a bus would discourage shoppers from using transit. It might be possible to provide a publicly subsidized package service in conjunction with the transit trip. Home delivery of the week's groceries by the public package service would help increase transit use, provide a service to the old or sick who could not handle their own packages in either car or bus, and perhaps bring a little more human contact into the sterile environment now found in suburban shopping centers.

Making the Freeway Work

Route 101 will continue to be Marin's Main Street. Every effort should be made to make it move as much traffic as possible without adding great chunks of new pavement. The county should always be ready to implement new ideas which will help the freeway operate at the highest possible service level without actually adding new lanes.

The first such idea is ramp metering. This concept should be supported by all jurisdictions affected by Route 101, and the Division of Highways should be encouraged to implement this concept as soon as possible.

An important aspect of making the freeway work is the upgrading of Marin's substandard interchanges. The Division of Highways should be encouraged to look into closing ramps at substandard cloverleafs and even possibly combining three too closely spaced interchanges into two. Two areas where interchange spacing is too close are:

Shoreline Highway - Seminary Drive - Tiburon Wye

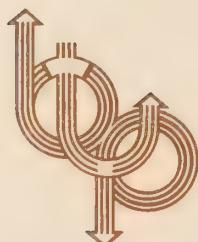
Tamalpais Drive - Lucky Drive - Sir Francis Drake Boulevard

Respacing interchanges or reducing the number from three to two in these areas would help freeway operation.

The Lincoln Avenue interchange in San Rafael should be closed or moved. If a frontage road connection from Lincoln Avenue to Los Ranchitos were made the Lincoln interchange could be closed. Removing this traffic along with, of course, the substandard Los Ranchitos and Merrydale Road connection, would greatly improve the very difficult Puerto Suello Hill section of Route 101.

Providing new interchanges should be carefully controlled, as discussed above, no interchanges north of Gross Field are recommended. In addition, Rodeo Avenue should not be upgraded, because Wolf Back Ridge is a planned urban open space area and the north section of Sausalito can be efficiently handled by the Bridgeway interchange.

As the possibility of further automating the freeway becomes reality every effort should be made to implement the new techniques, without the disruption of adding new lanes.



IMMEDIATE ACTIONS TO BEGIN IMPLEMENTATION

THE CITY-COUNTY PLANNING COUNCIL

The CCPC should:

Adopt a controlled development policy as described by the Countywide Plan. Encourage all members jurisdictions to adopt and begin enforcement of such a land-use policy.

Adopt the Balanced Transportation Plan. Encourage its member jurisdiction to re-orient their transportation budgets to include the recommendations made in the plan.

Request the California Division of Highways to implement the Balanced Transportation Plan in its area of jurisdiction. Two projects for immediate implementation are ramp metering and bus lanes on Route 101.

Request the Golden Gate Bridge, Highway and Transportation District to adopt a policy of no expansion of capacity at the Golden Gate Crossing beyond a special bus lane on the existing bridge deck, augmented by ferry service expansion to ultimately north Marin. The district should be encouraged to continue with its plan for a separate right-of-way trans-bay transit system in the Route 101 corridor north of the bridge.

THE COUNTY OF MARIN AND THE MARIN COUNTY TRANSIT DISTRICT

A union of effort by these jurisdictions is needed if effective balanced transportation facilities are to become a reality.

The county should immediately work to secure the revenues from the sales tax on gasoline, effective July 1, 1972. The scale of the

needs for intra-county transit service as shown by the work of Phase II requires that these funds be expended in a manner that will most directly benefit intra-Marin service.

Using the information developed in Phase II of the Balanced Transportation Program the county and Transit District should begin design of a comprehensive intra-Marin transit service. This design would include equipment, schedules, and roadway specifications. Roadways could be either widened arterial highways with exclusive bus lanes, new separate local busways, or a combination of both concepts.

A joint capital improvement program should then be developed for both intra-county transit and road programs. The Transit District should seek Urban Mass Transit Administration grants through the Metropolitan Transportation Commission to design facilities and prepare capital improvement programs.

The county should now begin legislative programs aimed at providing increased resources for transit facility construction and operation. The scale of this need has been demonstrated by the work of Phase II. Highway funding programs will also be needed in the long-run.

The Marin County Transit District should begin direct negotiation with the Division of Highways to establish ramp metering (with preferential treatment for buses) and exclusive bus lanes on Route 101. The Route 101 freeway is scheduled to be upgraded to a full eight lanes between Sausalito and Greenbrae by 1974. The Transit District should make every effort to see that the new lanes are reserved for bus use before they are opened to traffic. A first step might be a special bus and car pool lane, with car pools excluded when bus service expansion requires a full lane by itself.

THE CITIES OF MARIN

Local Jurisdictions should adopt and begin to implement the land-use and transportation policies of the Balanced Transportation Plan.

Transportation facility budgets will have to be integrated with the county and Transit District programs. As has been done for the road program with the Urban Thoroughfare System, a similar multi-jurisdictional funding procedure may be needed to complete the transit and roadway proposals of the Balanced Transportation Plan.

The cities should be prepared to develop their own capital improvement programs in conjunction with adjacent jurisdictions and within the framework of the Countywide Transportation Plan.

Transportation issues examined by Phase II for each local jurisdiction are discussed in detail in the last major section of this report.

NEXT STEPS - PHASE III

The Balanced Transportation Program should continue as the heart of the countywide transportation planning process.

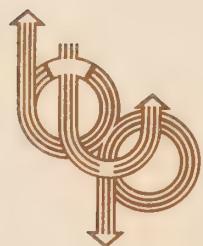
Phase III will start to provide the staffing and tools needed for implementing the long-range policies that have been established. Important products of Phase III will be the design of an intra-county transit system and the development of a capital improvement program for highways, transit, and other transportation systems.

A longer range study, also part of Phase III, will develop policy for weekend travel in Marin, particularly recreational travel to West Marin.

'The Phase III program will be part of the continuing transportation planning process. Major functions will be responding to changes in county policy, testing impacts of private development proposals, and evaluating the transportation proposals of various state, regional, and local public agencies.

Phase III will continue the inter-governmental cooperation for transportation planning. Agencies responsible for planning at state, regional, county and local levels will continue to meet and work together. Phase III will also continue the technical capabilities developed in Phases I and II allowing the county to test a continuing series of land-use or transportation policies and proposals.

The goal of this continuing transportation planning process is to develop as much information as possible for use by policy makers, to enable them to make decisions that will most fully achieve the goals of the Countywide Plan.



BALANCED TRANSPORTATION FOR EACH CITY AND LOCAL PLANNING AREA

The preceding sections of this report have dealt with transportation planning on a countywide basis with only occasional reference to local jurisdictions. The City-County Planning Council and the County Board of Supervisors have directed that the work of the Balanced Transportation Program be useful to the cities as well as the County of Marin. This section of the Phase II Report examines some of the important local issues which the work of Phase II has raised.

NOVATO

Central Area - With the completion of the Route 101 freeway bypass around central Novato and the implementation of the recommended commute and local transit systems, and a development pattern following the guidelines of the Countywide Plan, central Novato will have relatively few transportation problems.

The major continuing problems will be the connection from the Route 101 freeway to downtown. The flows of people in and out of downtown along with the east-west traffic through the central area cause demand for a four to six lane arterial connection to the freeway at DeLong Avenue. A section of separate east-west busway is recommended to alleviate some of the pressure but due to the complicated traffic patterns from the DeLong Avenue interchange which require a series of right and left turns to reach the central commercial area, the busway is only partially successful in decongesting auto flows.

Some areas of central Novato which now feel no traffic congestion will become somewhat congested by 1990, while the Redwood Highway should have its level of congestion reduced. DeLong Avenue, Diablo

Avenue and a short section of Novato Boulevard, San Marin Drive and Atherton Avenue should become four lane arterials by 1990. The remainder of central Novato arterials can remain at two lanes if the pace of development can be contained as recommended by the Countywide Plan and good transit service is initiated.

An extension of the Route 37 freeway through the central area of Novato is not recommended. The need for a good link between West Marin and the North Bay and the California central Valley areas for recreational travel will be studied as part of Phase III of the Balanced Transportation Program.

As discussed earlier in this report, it is recommended that no interchange be provided within Marin County on the Route 101 freeway north of Gross Field. The existing expressway should be converted to full freeway for safety reasons. Sufficient access to urban open space or continued agricultural areas as proposed by the Countywide Plan can be provided without direct interchange with the freeway.

Ignacio Area - The development of a major industrial area north of Hamilton Air Force Base along with expansion of the residential development throughout the Ignacio area will produce auto flows far exceeding the existing freeway interchange capacity. The approach to the freeway from the industrial area may require four lanes while all other arterials in the Ignacio area can operate at two lanes assuming the recommended level of transit service is implemented.

A connection from Ignacio Boulevard to Indian Valley Road, through the Indian Valley Campus of the College of Marin is not recommended. This route was found to offer little traffic service and could be quite disruptive to the campus area.

A facility which could add to the flow of traffic on the Ingacio interchange is the development of commercial airline service to Hamilton Field. Reports done by regional agencies indicate the demand for this service would be primarily between Marin and the Los Angeles basin. Because of the potential environmental impacts and the problems of ground access adding to an already congested area, it is recommended the development of commercial air service to Hamilton Field not occur until all alternatives have been thoroughly examined. Service between the Bay Area and Los Angeles might be provided by a high speed ground transportation link relieving existing commercial airports of a major portion of their projected travel demands.

SAN RAFAEL

Central Area - The central area of San Rafael will continue to be the main east-west travel corridor in Marin. The level of development for 1990 recommended in the Countywide Plan can be served by a high standard six lane arterial augmented by an exclusive lane busway from Route 101 to the Hub in San Anselmo. Local traffic in the downtown area would need an additional four lanes on east-west streets. A freeway in this corridor is not recommended.

The exclusive lane busway could be provided by allowing the buses to operate across the centerline of the six lane arterial. In downtown San Rafael this operation could be provided by allowing the bus to oppose traffic on the one-way street serving off-peak auto flows.

Two new routes are recommended which help to keep the expansion of Marin's major east-west corridor to only five auto lanes and one bus lane. These are a connector from Lucas Valley Road to Sir Francis Drake Boulevard at White Hill, discussed later in the special summary section on inter-valley connectors, and the waterfront

parkway from South San Pedro Road, across the San Rafael Canal, to Bellam Boulevard and Route 17.

The Waterfront Parkway provides a north-south route parallel to Route 101 for the people of the San Pedro peninsula. The Countywide Plan projects this area to have a population of about 15,000 by 1990. A large portion of this population will be traveling to and from the south and would have to use the Route 101 freeway interchange at Second Street, an area of very dense travel flows, if the parkway was not built. Construction of the parkway across the San Rafael Canal will allow these travelers to enter the Route 101 freeway at Bellam Boulevard, bypassing the very congested central San Rafael area. The parkway will also allow direct access from the San Pedro Peninsula to the Larkspur ferry terminal via point San Quentin without using Route 101.

The East Bay will also become more accessible via the Richmond Bridge without use of Route 101 which will be of growing importance, as the regional job market in this area is expected to grow even more rapidly than San Francisco jobs. In summary, the parkway is a four lane short-cut, relieving pressure on central San Rafael and Route 101, both areas of potentially severe congestion.

The parkway, however, is not without its own special problems. Crossing the San Rafael Canal will be expensive and a high level four lane bridge could have a severe visual impact. Further, the route itself has the potential to cut off people access to the waterfront. The Countywide Plan calls for a strip of waterfront open space in this area and the parkway should not be constructed until the open space has been secured and the Bay access problems have been worked out. The bridge over the canal should be a low level draw-bridge with the water activities of the canal scheduled around the heaviest bus and auto loads.

Beyond the environmental concerns is the problem of the interchange at Route 101, 17, and Bellam Boulevard. A four lane Bellam Boulevard cannot be serviced by the existing interchange and a major redesign will be needed.

The Lincoln Avenue interchange with Route 101 is substandard and located too close to the North San Pedro Road interchange. It recommended that a frontage road connection from Lincoln Avenue to Los Ranchitos Road be constructed, probably as a tunnel so an expansion of the existing freeway cut through Puerto Suello Hill will not be required, and the Lincoln Avenue interchange subsequently moved about $\frac{1}{4}$ mile south or completely closed.

Las Gallinas Basin - This area should experience relatively few transportation problems if development is controlled as recommended by the Countywide Plan. A new route should be constructed along Smith Ranch Road to the Bay for service to the Las Gallinas Creek ferry terminal. This route will also provide access to areas designated as open space on the Countywide Plan. The open space should be secured before the Las Gallinas Ferry Terminal or the road to it are constructed. The interchange with Route 101 at Lucas Valley Road will need some redesign to accommodate traffic from the east side of the freeway. Lucas Valley Road will need four lanes for approximately $2\frac{1}{2}$ miles west from Route 101.

The Freitas Parkway interchange with Route 101 will be a continuing problem in this area. The interchange will have to be totally reconstructed if major new developments continue to be approved on the east side of the freeway. A second option would be to close this interchange to traffic destined to sites east of the freeway, and service east side properties by a bus only link across Route 101 combined with the existing frontage road. It is recommended that the new private developments be required to participate finan-

cially in providing whatever access is finally deemed most appropriate for servicing the burgeoning east side development.

CONNECTORS BETWEEN TERRA LINDA-LUCAS VALLEY AND THE UPPER ROSS AND SAN GERONIMO VALLEYS

The connections from the Las Gallinas Basin (Terra Linda, Lucas Valley, Marinwood, etc.) to the Upper Ross Valley (San Anselmo, Fairfax, Sleepy Hollow, etc.) has been discussed in various local and county plans for at least 20 years. The connection is shown in the County's Streets and Highways Plan of 1954.

The main benefits of such connections have been cited as:

1. A bypass to Route 101 and the central San Rafael-San Anselmo east-west corridor. This corridor has long been Marin's most traveled east-west route and the resulting congestion has long been a problem for central San Rafael.
2. Provision of a route for emergency vehicles when Route 101 or the 4th Street-Redhill Avenue route become congested. Sleepy Hollow pays heavily for fire insurance because of its isolated location. Access to hospitals from Sleepy Hollow and other Upper Ross Valley areas would be improved if a direct link to the Kaiser Hospital in Terra Linda could be provided. Escape from Sleepy Hollow in case of fire or other disaster would be easier if a route existed to the north as well as to the south.
3. Provision of greater access to shopping, government, and employment for residents of the Upper Ross Valley.

The results of testing a series of alternative connections has lead to the following recommendations: A two-lane connector from Lucas

Valley Road to Sir Francis Drake Boulevard at White Hill Pass be constructed following acquisition of the lands around this route for permanent open space; A connection to Butterfield Road is recommended for emergency and transit vehicles only. Phase II technical analysis found that full roadway connection to Sleepy Hollow would severely impact the existing character of that valley.

The possibility of a link for only transit and emergency vehicles was examined as a potential solution which would provide most of the benefits listed above while at the same time not detrimentally effect the character of local neighborhoods. The transit system would benefit by offering an exclusive link from Terra Linda to the Upper Ross Valley which would be much shorter than the automobile connection between the same two points. The emergency route would be provided to overcome the hazards of living in a cul-de-sac valley, and also bring emergency medical services 10 minutes closer to most of the residents of the Upper Ross Valley.

Because of the noise created by current transit vehicles on steep grades, a tunnel connection was examined. The very high costs of tunneling compared with the projected patronage on the exclusive link do not, however, appear to justify a special tunnel. It is expected that a quiet, smog-free, transit vehicle will be developed in the next decade and such a vehicle could operate over the ridge with minimum environmental impact.

In order to maintain the main east-west corridor through San Rafael and San Anselmo at six lanes with a "fair" level of service, the Lucas Valley-White Hill connector recommended above is needed. Possible choices, however, would be to build two additional lanes in the major corridor from San Rafael to San Anselmo, bringing the lanes along Redhill Avenue to a total of eight, or to build nothing

and allow congestion and its impact on the amenities of life to grow to much higher levels than exist in 1972. These results are projected even if the pace of development follows Countywide Plan guidelines and a major intra-county transit system is constructed. Neither eight lanes along Redhill Avenue nor massive congestion in that corridor are recommended solutions.

FAIRFAX

Fairfax should be prepared to provide for a short section of four lane arterial along Center Street to tie into this route at the San Anselmo line. A total of four good lanes is needed through downtown along with a separate lane for buses. Most of the right-of-way for such a system is available in Fairfax combining Sir Francis Drake Boulevard, Center Street and the Parkade area.

The impact of the Lucas Valley-White Hill connector helps to keep the problems of central Fairfax at a relatively manageable scale. This connector may have even greater impact on weekend travel by providing an alternate route to Sir Francis Drake Boulevard. Recreational travel will be studied in Phase III of the Balanced Transportation Program.

SAN ANSELMO

San Anselmo sits astride two major east-west routes across Marin and it is the intersection of these routes that form the "Hub". San Anselmo has had a policy of not providing any additional highway capacity until a transit system was developed and a by-pass roadway was constructed around the city. Phase II recommends both a separate transit way through the city and a by-pass route from Lucas Valley to White Hill west of Fairfax. In addition to these facilities it is recommended that two additional lanes be provided along Redhill Avenue, through the Hub, and out the Sir Francis Drake Boulevard-Center Street corridor to Fairfax. Center Street

appears to offer the best opportunity for providing two additional lanes by 1990. This widening might be done in stages, the first of which could be a lane for buses only. No other routes will need widening by 1990 but a separate busway will be needed both east and south from the Hub. Not providing at least these facilities would mean considerably more congestion for San Anselmo by 1990. Not implementing the Countywide Plan's controls on population will make the need for expanded transportation facilities even greater.

ROSS

Ross sits astride the second most important east-west travel corridor in Marin County. Both San Anselmo and the County are developing four lane routes on Sir Francis Drake Boulevard and Ross should eventually plan to meet these four lane sections. The auto volumes through Ross will allow for exclusive lane bus operation across the median of a four lane road leaving only one lane for off-peak direction auto and bus traffic. Providing for this expanded roadway might be done in conjunction with the flood control project through Ross. Ross has resisted further extensions of the concrete flood control channel but flooding will continue to occur until the flood control project is complete.

A possible solution would be to leave the remaining creek in its natural state, build a culvert under Sir Francis Drake Boulevard to handle flood waters, and also provide for new bus and auto lanes while the culvert is being built. This solution would provide right-of-way for three separate public services, transit, roadways, and flood control. Community disruption, environmental impact, and costs for each service could be minimized by providing for all three in one right-of-way.

A high capacity transit system and a widened Sir Francis Drake Boulevard were found to be required despite controlling the pace of

development as recommended by the Countywide Plan. Should the housing market go unchecked, even greater travel demands can be expected through the center of Ross.

LARKSPUR

Larkspur will face transportation problems in two separate corridors; along Sir Francis Drake Boulevard and through the downtown area.

Problems on Sir Francis Drake are expected to begin at the current ferry terminal site which is so close to the Route 101 freeway that traffic density and turning movements will cause considerable congestion at peak hour. At least four lanes will be needed on East Sir Francis Drake Boulevard along with good ferry feeder bus service.

A regional shopping center was assumed to locate on the Bon Air site. This center will require a two lane connection to the freeway to serve only the shopping oriented trips. The high density residential areas at Bon Air will need two lanes as far West as La Cuesta Drive. Through traffic and the remaining activity centers of Greenbrae will need an additional four lanes. These highway lanes will have to be supplemented by a separate bus right-of-way as far West as College Avenue.

The stretch of Sir Francis Drake Boulevard from the ferry terminal to Bon Air Drive is projected to become a very difficult problem. Larkspur should begin now to plan for a transportation system which will be able to meet these problems. It is recommended that a long range plan to remove the ferry terminal to Point San Quentin be pursued and the impact of the proposed regional shopping center be carefully studied before the city gives its blessing to such a development at Bon Air.

In another area of the town, Larkspur faces a different and potentially as difficult problem. Magnolia Avenue from downtown to Corte Madera passes through established residential and commercial areas. A minimum disruption to this area is recommended, yet forecast travel demands indicate that at least three auto lanes and a bus lane will be needed by 1990. A possible solution may be provided by using the abandoned railroad right-of-way parallel to Magnolia Avenue for a bus and auto street. Old Magnolia and the new two lane route could each be one-way streets with an exclusive bus lane opposing off-peak hour traffic. Use of the railroad right-of-way for transit has long been a goal of the County and it is recommended Larkspur move to provide a transit way. Bike and hiking paths also should be provided parallel to the transit system.

If Larkspur desires to preserve its unique downtown area, it will have to move to relieve what is projected to be a high volume of bus and auto trips through that area. Even with the controlled development of the Countywide Plan, this is a problem. The unrestrained housing market is projected to make the problem even more difficult.

CORTE MADERA

The main east-west route in Corte Madera, Tamalpais Avenue, will need to be upgraded between the shopping areas and the Route 101 freeway. Four lanes west of Tamal Vista plus a separate bus right-of-way will be needed by 1990.

The continuation of transit south to Mill Valley along the old railroad right-of-way is recommended when new technology produces small, non-polluting transit vehicles. For the short term this section of right-of-way is not needed for transit purposes and the City of Mill Valley holds a position against using its segment for conven-

tional bus transit vehicles.

Corte Madera should consider the impact a regional shopping center would have on its character and specifically on its transportation system. The impact of such a center assumed to be built at Bon Air was described in the Larkspur summary. The problems of Route 101 and Sir Francis Drake Boulevard caused by such a large traffic generator would be transferred to Paradise Drive and Route 101 should the center be located at that interchange.

MILL VALLEY

The most critical problem for the Mill Valley area will be the approach to the Route 101 freeway along Shoreline Boulevard. This interchange services traffic from Tennessee Valley, Tamalpais Valley, and the southern section of Mill Valley. It is recommended a separate busway be provided around this high density traffic area but despite the busway, this approach to Route 101 will need six lanes by 1990 from Tennessee Valley Road to the freeway.

Relief for the congested Shoreline interchange with Route 101 would be provided by re-orienting the extension of Miller Avenue from the Tam Junction area to an interchange with Route 101 at Seminary Drive. Mill Valley may wish to explore the possibility of not extending Sycamore to Route 101 and replacing this proposed street with a re-oriented Miller Avenue extension. Such a plan would relieve some of the problems in the Tam Junction area.

Mill Valley should also be prepared to allow use of the Northwestern Pacific Railroad right-of-way for public transit. The right-of-way may not be needed in the immediate future because the busway on Route 101 will have sufficient capacity to carry north-south transit users for at least a decade. But, particularly when new transit hardware, expected to be smaller, quieter, and non-polluting becomes

available, the NWP right-of-way is projected to become an important transit link for longer range travel forecasts. The right-of-way should be used for bike paths and horse trails in both short and long term plans.

TIBURON-BELVEDERE

The main travel corridor for Tiburon and Belvedere is, of course, Tiburon Boulevard. From its interchange with Route 101 to downtown this route will pose a challenge to transportation planners. The substandard interchange with Route 101 should be re-designed as should the frontage road connection from the Strawberry Shopping Center to the interchange. A separate busway is needed from the freeway to Strawberry Drive parallel to a six-lane roadway for autos by 1990. From Strawberry Drive to approximately Rock Hill Drive two lanes for auto and one for buses is needed in the peak direction with one lane serving off-peak autos and buses. The remainder of Tiburon Boulevard can operate as a high capacity two lane road. Use of the old railroad right-of-way for these roadway improvements should be minimal and the existing bike paths and Bay access maintained.

Improvement of the Seminary Drive interchange by tieing directly to Sycamore Avenue (or Miller Avenue as explained in Mill Valley summary) and Ricardo Avenue would help relieve the six-lane section of Tiburon Boulevard. The Strawberry Shopping Center access to residential areas west of the freeway should be improved if possible. Both the Seminary Drive and Tiburon Boulevard interchanges might be simplified by establishing a "split diamond" type of interchange between the two of them.

Problems in this area appear difficult even with the controlled development patterns of the Countywide Plan. Uncontrolled development will mean even greater transportation problems.

SAUSALITO

Sausalito's main transportation problems are projected to continue to continue to occur on weekends rather than weekday peak hours. Phase III will study weekend travel in detail.

The main reason for the success of Sausalito's weekday system was the very high use of transit developed for home-to-work type trips. Over half the travelers on Sausalito's main street, Bridgeway, are projected to use transit leaving a four lane travel demand for autos by 1990. Bridgeway south of downtown had only a two lane requirement thanks to heavy transit use.

WEST MARIN

Weekday travel will not require any new transportation facilities in West Marin if the land-use proposals of the Countywide Plan are fully implemented.

Transportation problems in this area will be focused on recreational trips. Phase III will study in detail the problem of providing access to the major recreational facilities of West Marin.

PHASE III AND LOCAL CITY JURISDICTIONS

Phase III has been designed to continue the analytical capability of the Balanced Transportation Program. This ability will be available to the local jurisdictions of Marin and each city is encouraged to call on the program for evaluation of major private developments or new public transportation facility proposals.

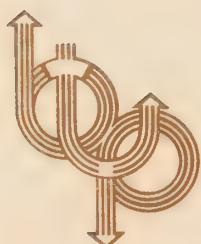


TABLE 16

HIGHWAY AND TRANSIT LANES REQUIRED BY 1990

STATE HIGHWAYS	Lanes Added For					
	Transit and Auto in "Mixed" Traffic		Peak-Hour Reversible Transit		Separate Right-of-Way Transit	
	Lanes Added	Lane- Miles	Lanes Added	Lane- Miles	Lanes Added	Lane- Miles
ROUTE 101						
Golden Gate Bridge-Sausalito Lateral					2	1.1
Sausalito Lat-Rodeo					2	4.3
Rodeo-Bridgeway	1	1.0			2	2.0
Bridgeway-Shoreline					2	1.5
Shoreline-Tiburon	2	3.2			2	3.2
Tiburon-Paradise					2	3.3
Paradise-Sir Francis Drake	2	2.8			2	2.8
Sir Francis Drake-Route 17	2	2.7			2	2.7
Route 17-2nd Street	1-2	1.4			2	1.8
2nd Street-Lincoln	2	2.8			2	2.8
Lincoln-North San Pedro					2	1.0
North San Pedro-Freitas Parkway	2	2.0			2	2.0
Freitas Parkway-Miller Crk.	2	3.8			2	3.8
Miller Creek-Hamilton Air Force Base					2	2.3
Hamilton Air Force Base-Route 37	2	4.8			2	4.8
Route 37-Rowland	2	2.2			2	2.2
Rowland-DeLong Avenue	6	5.5*			2	2.4
DeLong-Atherton Avenue	4	3.9*				
ROUTE 1 (Shoreline Hwy.)						
Route 101-Almonte	4	2.5			1	0.5
ROUTE 131 (Tiburon Blvd.)						
Route 101-Trestle Glen	2	2.0				
Trestle Glen-Main	1	1.3	1	1.3	1	1.0
TOTAL - STATE HIGHWAYS		41.9		1.3		45.5
*Section under construction in 1972						

TABLE 16 (Continued)

CITY-COUNTY ARTERIALS	Lanes Added For			
	Transit and Auto in "Mixed" Traffic	Lanes Added	Peak-Hour Reversible Transit	Separate Right-of-Way Transit
	Lane- Added Miles	Lanes Lane- Added Miles	Lanes Lane- Added Miles	Lanes Lane- Added Miles
BRIDGEWAY				
Harbor to Route 101	1	0.5		
ALMONTE (A-126)				
Shoreline to Miller	2	0.7		
BLITHEDALE				
Route 101 to Camino Alto	1	0.9		
TAMALPAIS AVENUE				
Route 101 to Magnolia	2	1.0		1 1.0
MAGNOLIA AVENUE				
Tamalpais to Doherty	1	1.0	1 1.0	
COLLEGE AVENUE (A-20)				
Magnolia to Sir Francis Drake	2	1.0		
SIR FRANCIS DRAKE (A-133, 102, 103, 104, 109)				
Route 17 to Route 101	2	3.2		1 1.6
Route 101 to La Cuesta	2-4	1.9		1 0.7
La Cuesta to Laurel Grove				1 0.9
Laurel Grove to College	2	1.0		1 0.5
College to Bolinas (SA)	1	1.2	1 1.2	
Bolinas to Hub				1 0.6
Hub to Fairfax	2	3.2		1 1.6
2ND & 3RD STREETS				
Route 101 to 4th Street	1-2	1.4	1 1.1	
4TH STREET/REDHILL AVENUE				
2nd Street to Hub	2	2.3	1 0.7	1 0.4

TABLE 16 (Continued)

CITY-COUNTY ARTERIALS	Lanes Added For		
	Transit and Auto in "Mixed" Traffic Lanes Lane- Added Miles	Peak-Hour Reversible Transit Lanes Lane- Added Miles	Separate Right-of Way Transit Lanes Lane- Added Miles
BELLAM-BAYFRONT PARKWAY			
Route 17/101 to South San Pedro	4 6.8		
SAN PEDRO ROAD (A-101)			
Route 101 to Lochinvar		1 3.9	
Lochinvar to Knight	2 1.2		
FREITAS PARKWAY			
Route 101 to Las Gallinas	2 0.6		1 0.3
Las Gallinas to Lea Drive			1 0.8
LUCAS VALLEY ROAD (A-100, 113)			
Route 101 to Ferry Terminal	2 3.6		
Route 101 to Miller Crk.	2 1.8	1 2.1	1 0.9
Miller Creek to Mt. McKinley	1 1.8	1 1.8	
NOVATO BOULEVARD (A-114)			
Grant to Wilson	2 0.9		
LUCAS VALLEY-WHITE HILL			
Lucas Valley to Del Ganado	2 1.2		
Del Ganado to White Hill	2 6.1		
DIABLO AVENUE			
Novato Blvd. to Redwood Highway	2 0.4		
DELONG AVENUE			
Redwood Hwy. to Route 101	2 1.0		

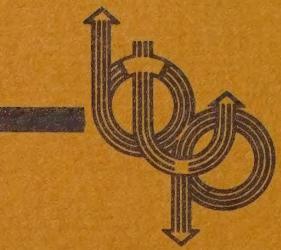
TABLE 16 (Concluded)

CITY-COUNTY ARTERIALS	Lanes Added For			
	Transit and Auto in "Mixed" Traffic Lanes	Lane- Added Miles	Peak-Hour Reversible Transit Lanes	Lane- Added Miles
OLIVE AVENUE 4th to Redwood	2	0.6		1 1.0
TOTAL ARTERIALS		45.3	13.1	10.3
COUNTYWIDE SUMMARY State Highways Arterials		41.9 45.3	1.3 13.1	45.5 10.3
TOTAL		87.2	14.4	55.8

U.C. BERKELEY LIBRARIES



C124901375



BALANCED TRANSPORTATION PROGRAM

MARIN COUNTY